⚠ IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the copier and peripherals, make sure that the copier power cord is unplugged.
2. The wall outlet should be near the copier and easily accessible.
3. Note that some components of the copier and the paper tray unit are supplied with electrical voltage even if the main switch is turned off.
4. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. If the Start key is pressed before the copier completes the warm-up period (the Start key starts blinking red and green alternatively), keep hands away from the mechanical and the electrical components as the copier starts making copies as soon as the warm-up period is completed.
6. The inside and the metal parts of the fusing unit become extremely hot while the copier is operating. Be careful to avoid touching those components with your bare hands.

HEALTH SAFETY CONDITIONS

1. Never operate the copier without the ozone filters installed.
2. Always replace the ozone filters with the specified ones at the specified intervals.
3. Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The copier and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.
2. The RAM board on the system control board has a lithium battery which can explode if replaced incorrectly. Replace the battery only with an identical one. The manufacturer recommends replacing the entire RAM board. Do not recharge or burn this battery. Used batteries must be handled in accordance with local regulations.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate toner bottles or used toner. Toner dust may ignite suddenly when exposed to an open flame.
2. Dispose of used toner, developer, and organic photoconductors in accordance with local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.
4. When keeping used lithium batteries in order to dispose of them later, do not put more than 100 batteries per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

LASER SAFETY

The Center for Devices and Radiological Health (CDRH) prohibits the repair of laser-based optical units in the field. The optical housing unit can only be repaired in a factory or at a location with the requisite equipment. The laser subsystem is replaceable in the field by a qualified Customer Engineer. The laser chassis is not repairable in the field. Customer engineers are therefore directed to return all chassis and laser subsystems to the factory or service depot when replacement of the optical subsystem is required.

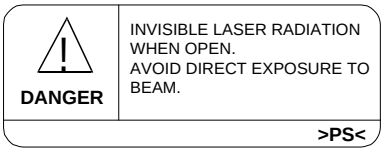
⚠ WARNING

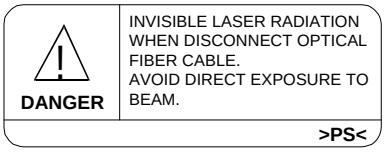
Use of controls, or adjustment, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

⚠ WARNING FOR LASER UNIT

WARNING: Turn off the main switch before attempting any of the procedures in the Laser Unit section. Laser beams can seriously damage your eyes.

CAUTION MARKING:





SECTION 1

OVERALL MACHINE INFORMATION

1. SPECIFICATIONS

Configuration: Desktop

Copy Process: Dry electrostatic transfer system

Originals: Sheet/Book

Original Size: Maximum A3/11" x 17"

Copy Paper Size: Maximum
A3/11" x 17"
Minimum
A5/8 1/2" x 5 1/2" sideways (Paper tray)
A6/5 1/2" x 8 1/2" lengthwise (By-pass)

Copy Paper Weight: Paper tray:
60 ~ 90 g/m^2, 16 ~ 24 lb
By-pass:
60 ~ 157 g/m^2, 16 ~ 42 lb

Reproduction Ratios: 5 Enlargement and 7 Reduction

	A4/A3 Version	LT/DLT Version
Enlargement	400% 200% 141% 122% 115%	400% 200% 155% 129% 121%
Full size	100%	100%
Reduction	93% 87% 82% 71% 65% 50% 25%	93% 85% 77% 74% 65% 50% 25%

Zoom: 25% to 400% in 1% steps

Power Source: 120V/60 Hz:
More than 12 A (for North America)
220V ~ 240V/50 Hz:
More than 7 A (for Europe)
220V ~ 240V/60 Hz:
More than 7 A (for Asia)

Power Consumption:

	Mainframe Only		Full System	
	120V	220V ~ 240V	120V	220V ~ 240V
Maximum	Less than 1.1 kW	Less than 850 W	Less than 1.2 kW	Less than 1 kW
Copying	Approx. 470 W	Approx. 500 W	Approx. 500 W	Approx. 530 W
Warm-up	Approx. 1.0 kW	Approx. 750 W	Approx. 1.0 kW	Approx. 750 W
Stand-by	Approx. 130 W	Approx. 130 W	Approx. 140 W	Approx. 140 W
Auto Shut Off	Approx. 2.0 W	Approx. 2.2 W	Approx. 2.2 W	Approx. 2.4 W

NOTE: Full System: Mainframe + ADF + Paper Tray Unit + Duplex Tray + 1-bin Sorter

Noise Emission:

	Mainframe Only	Full System
1. Sound Power Level		
Copying	61.5 dB(A)	64.5 dB(A)
Stand-by	30.0 dB(A)	30.0 dB(A)
2. Sound Pressure Level at the Operator Position		
Copying	47.5 dB(A)	52.0 dB(A)
Stand-by	17.5 dB(A)	17.5 dB(A)

NOTE: The above measurements were made in accordance with ISO 7779.
Full System: Mainframe + ADF + Paper Tray Unit + Duplex Tray + 1-bin Sorter

Dimensions (W x D x H): 550 x 580 x 652 mm (21.7" x 22.9" x 25.7")
Measurement Conditions
1) With by-pass feed table closed
2) Without the optional paper tray unit
3) Without the ADF

Weight: Less than 57 kg (126 lb)

Copying Speed in Multicopy mode (copies/minute):

	A4 sideways/ 11" x 8$_{1/2}$"	A3/11" x 17"	B4/8$_{1/2}$" x 14"
No optional memory	15	9	10
With 4MB or 8MB optional memory	20	11	12

Warm-up Time Less than 30 seconds (20°C, 68°F): 115V machine
Less then 35 seconds (20°C, 68°F): 230V machine

First Copy Time: Less than 9.8 s (from 1st paper tray to face down copy tray)
Less than 8.8 s (from 1st paper tray to face up copy tray)

Copy Number Input: Ten-key pad, 1 to 99 (count up or count down)

Manual Image Density: 7 steps

Automatic Reset: 60 s is the standard setting; it can be changed with a UP mode.

Auto Shut Off: 15 min. is the standard setting; it can be changed with a UP mode.

Copy Paper Capacity:
Paper Tray: 250 sheets
Optional Paper Tray Unit: 500 sheets x 2
Bypass: 100 sheets (A4, B5, A5, B6, 8.5 x 11", 5.5 x 8.5")
10 sheets (A3, B4, 11 x 17", 8 x 13")
1 sheet (non-standard sizes)

Toner Replenishment: Cartridge exchange (216 g/cartridge)

Toner Yield: 8 k copies (A4 sideways, 6% full black, 1 to 1 copying, ADS mode)

Optional Equipment:
- Platen cover
- Auto document feeder
- Paper tray unit with two paper trays
- 1-bin sorter
- Duplex unit
- Key counter
- Tray heater
- Optical anti-condensation heater

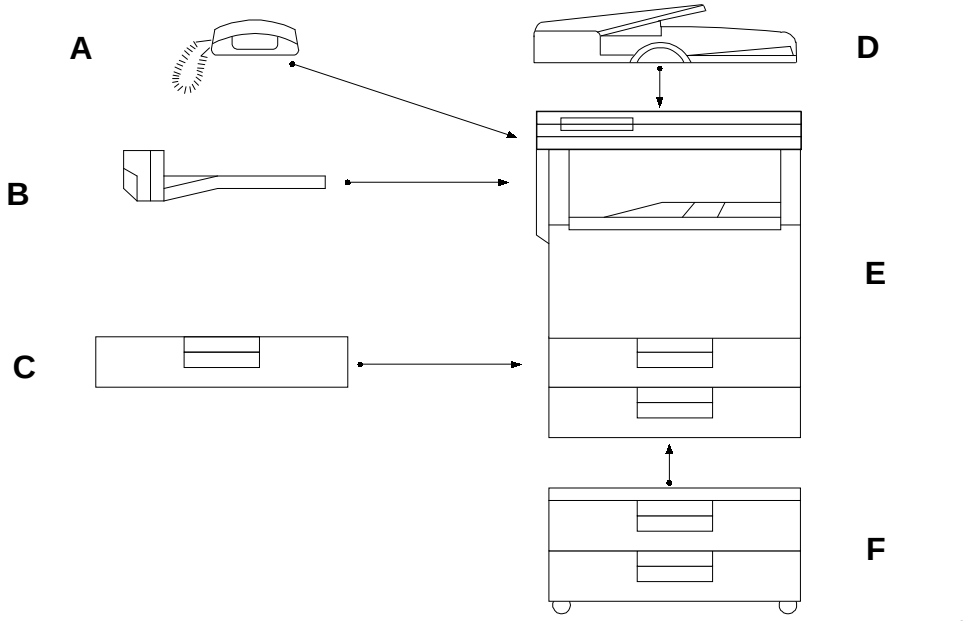
Copy Tray Capacity:
Face down mode: 500 sheets
Face up mode: 100 sheets

Memory Capacity:

		Standard (4 MB)	Optional 4 MB	Optional 8 MB
Multi duplex copy		X	O	O
Sort, Rotate Sort	A4, LT	O	O	O
	B4, LG	X	O	O
	A3, DLT	X	O	O
Number of pages	A4 6%	35	99	99
	ITU-T#4	15	45	75

X: Not AvailableO: Available

2. MACHINE CONFIGURATION



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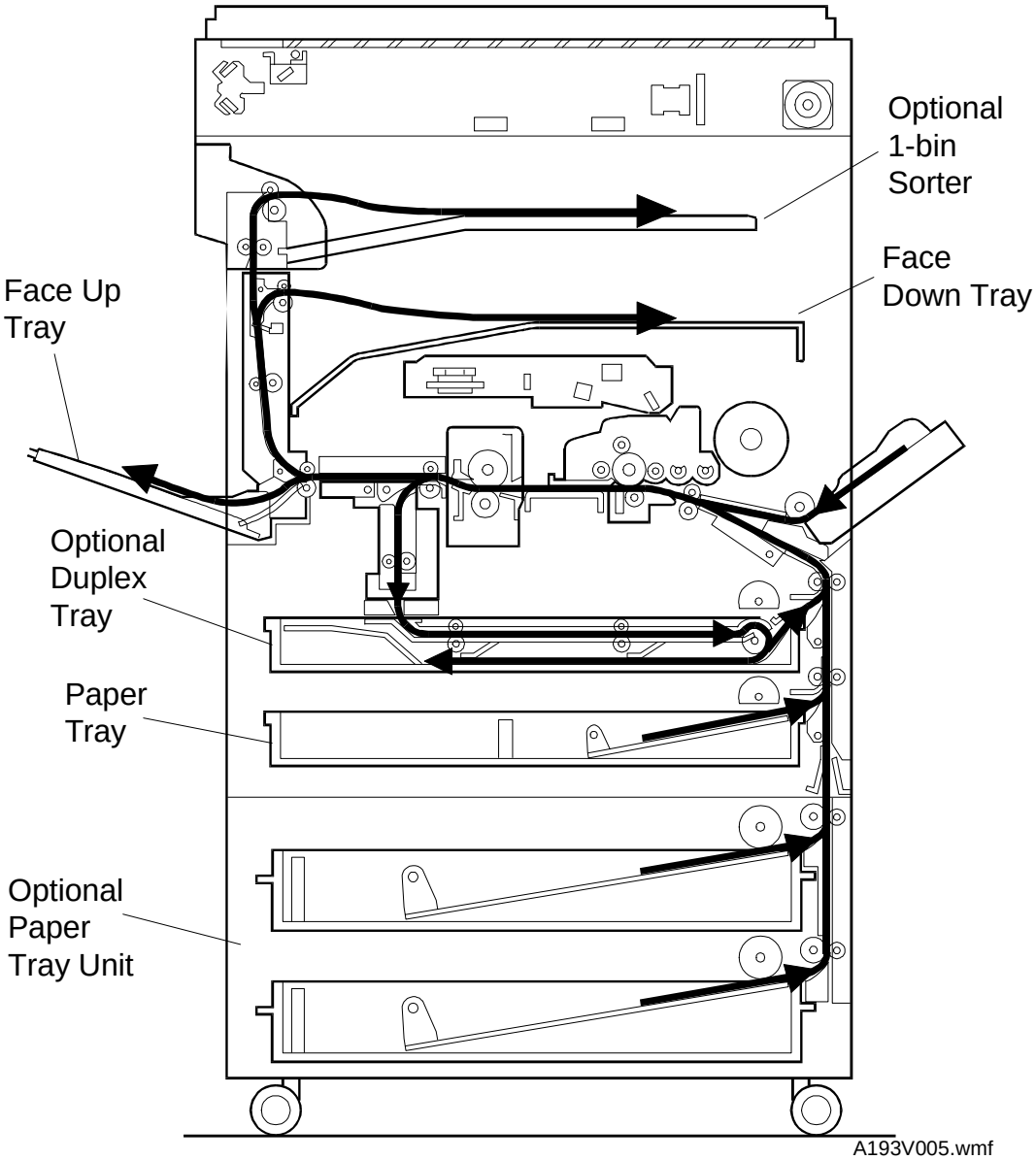
Version	Item	Machine Code	No.
Copier	Copier	A193	E
	ADF (Option)	A628	D
	Paper Tray Unit (Option)	G697	F
	Duplex Unit (Option)	G694	C
	1-bin Sorter (Option)	A629	B
	Platen Cover (Option)	A645	
	Memory 4MB (Option)	A642-01	
	Memory 8MB (Option)	A642-02	
Fax	Fax Controller (Option)	A639-01 (115V), -02(230V), -03(France), -04 (TWN)	
	Telephone (Option)	H160	A
	ISDN (Option)	A644-01(115V), -02(230V)	
	HDD (Option)	A641	
	Memory Card (Option)	H130-54	
	Function Card (Option)	H130-52	
	Page Memory (Option)	A640	
Printer	Printer Controller (Option)	A643-00 (115V), -01(230V)	
	PS Option (Option)	A643-02	
	HDD (Option)	A643-03	

3. PAPER PATH


Optional
1-bin
Sorter
Face
Down Tray
Face Up
Tray
Optional
Duplex
Tray
Paper
Tray
Optional
Paper
Tray Unit
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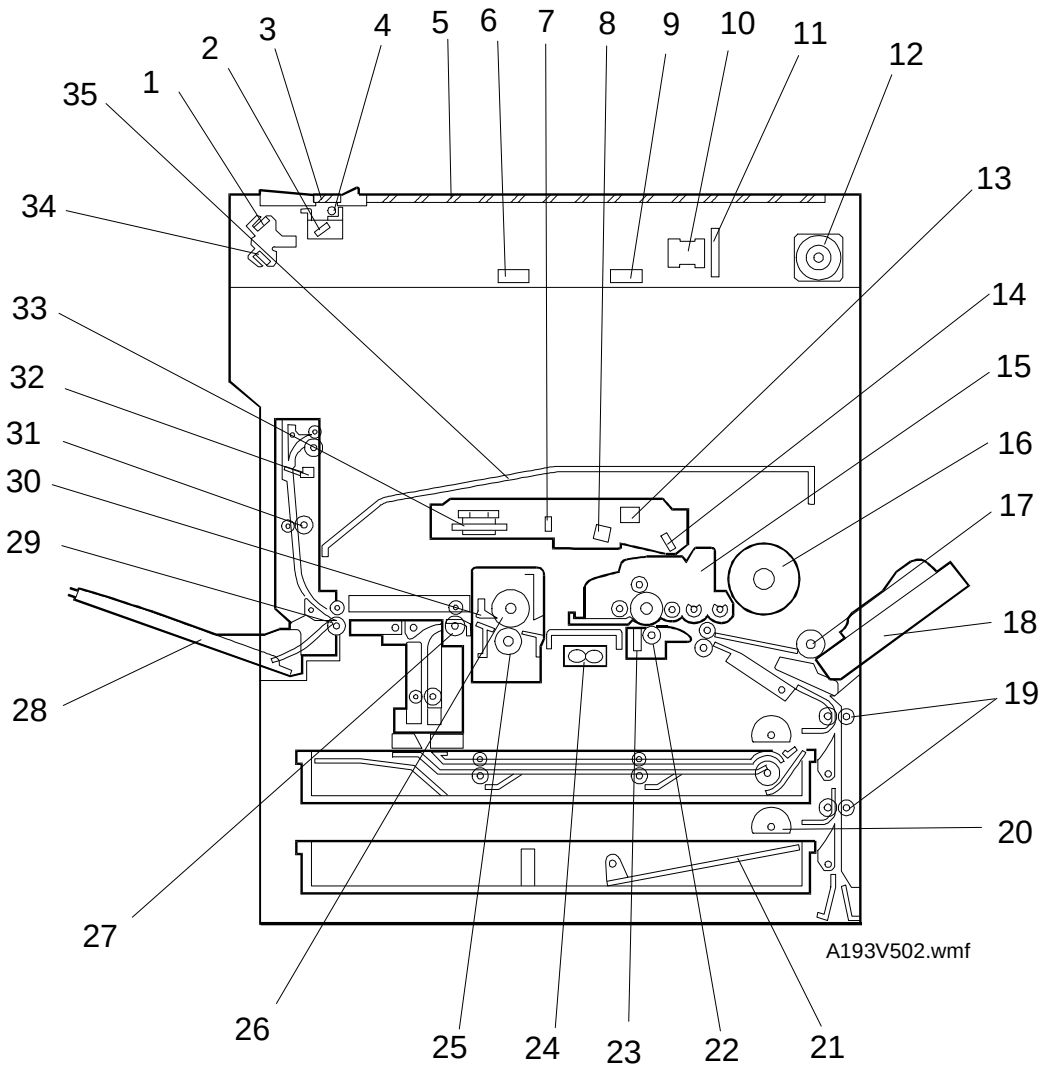
4. MECHANICAL COMPONENT LAYOUT



1. 2nd Mirror
2. 1st Mirror
3. DF Exposure Glass
4. Xenon Lamp
5. Exposure Glass
6. Original Width Sensors
7. 1st Mirror
8. Barrel Toroidal Lens (BTL)
9. Original Length Sensors
10. Lens
11. SBU Board
12. Scanner Motor
13. F-theta Mirror
14. 2nd Mirror (Laser Unit)
15. PCU
16. Toner Bottle
17. By-pass Feed Roller
18. By-pass Table
19. Relay Rollers
20. Paper Feed Rollers
21. Bottom Plate
22. Transfer Roller
23. Separation Brush
24. Transport Vacuum Fan
25. Pressure Roller
26. Hot Roller
27. Fusing Exit Roller
28. Left Vertical Door/Face Up Tray
29. Junction Gate
30. Hot Roller Strippers
31. Left Vertical Roller
32. Lower Exit Sensor
33. Polygonal Mirror Motor
34. 3rd Mirror
35. Face Down Tray

5. ELECTRICAL COMPONENT DESCRIPTIONS

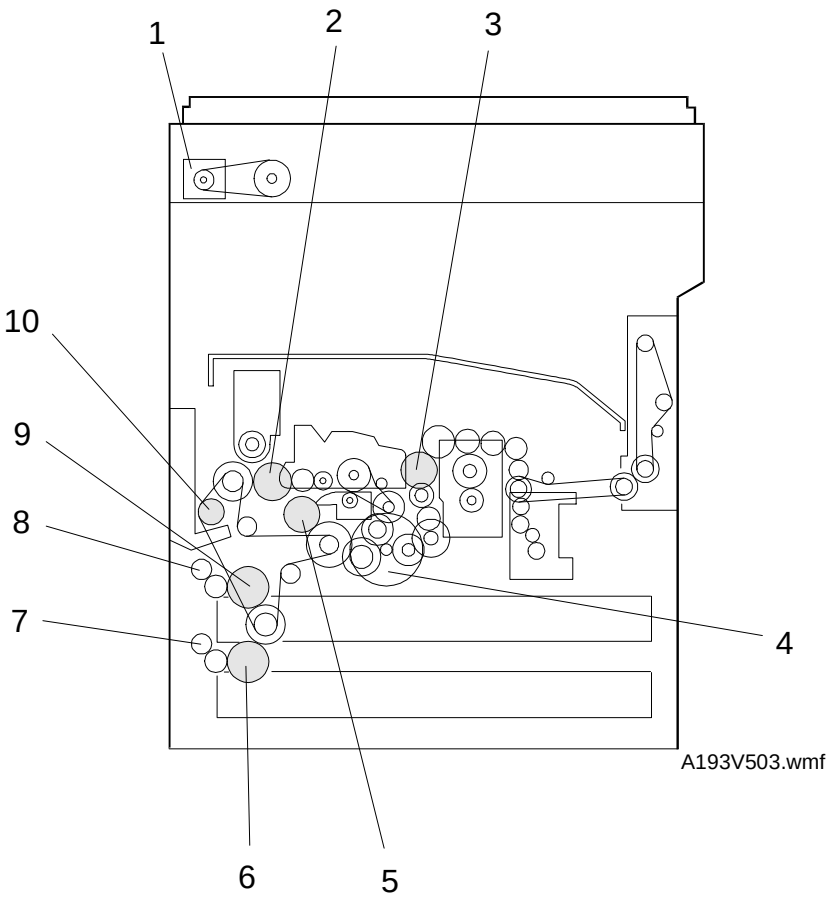
Refer to the electrical component layout and the point-to-point diagram on the waterproof paper in the pocket for the locations of these components.

Symbol	Index No.	Description	Note
Printed Circuit Boards			
PCB1	54	High Voltage Supply Board	Supplies high voltage to the drum charge roller, development roller, transfer roller, and discharge brush.
PCB2	50	Lamp Stabilizer	Provides dc power for the exposure lamp.
PCB3	58	PSU	Provides dc power to the system and ac power to the fusing lamp.
PCB4	61	LD Unit	Controls the laser diode.
PCB5	62	Operation Panel	Controls the touch panel display and LED matrix, and monitors the key matrix.
PCB6	51	SBU	Contains the CCD, and outputs a video signal to the BICU board.
PCB7	55	IOCSS	Controls the mechanical parts of the printer.
PCB8	52	BICU	Controls all copier functions both directly or through other control boards.
PCB9	53	MSU	Compressed the image data, stores the data, and applies the image editing.
Motors			
M1	45	Main	Drives the main body components.
M2	36	Scanner Drive	Drives the 1st and 2nd scanners (dc stepper motor).
M3	47	Transport Vacuum Fan	Aids paper transportation from the transfer roller to the fusing unit.
M4	49	Polygonal Mirror	Turns the polygonal mirror.
M5	37	Toner Supply	Rotates the toner bottle to supply toner to the toner supply unit.
M6	35	Exhaust Fan	Removes heat from around the fusing unit.
Sensors			
S1	33	Upper Exit	Detects misfeeds.
S2	31	Lower Exit	Detects misfeeds.
S3	28	Left Vertical Door	Cuts the +5 and +24 Vdc power lines.
S4	27	Left Door	Detects whether the left door is open or closed.
S5	17	Relay	Detects the leading edge of paper from the paper tray and duplex unit to determine the stop timing of the paper feed clutch and duplex feed motor. Also detects misfeeds.
S6	10	PCU	Detects when a new PCU is installed.
S7	29	Fusing Exit	Detects misfeeds.

Symbol	Index No.	Description	Note
S8	9	Charge Roller H.P	Informs the CPU when the drum charge roller is at home position.
S9	14	Upper Tray Paper End	Informs the CPU when the upper paper tray runs out of paper.
S10	15	Lower Tray Paper End	Informs the CPU when the lower paper tray runs out of paper.
S11	16	By-pass Feed Paper End	Informs the CPU when there is no paper in the by-pass tray.
S12	12	Registration	Detects the leading edge of the copy paper to determine the stop timing of the paper feed clutch, and detects misfeeds.
S13	11	By-pass Feed Paper Width	Detects the width of the paper in the by-pass feed table.
S14	59	Humidity	Monitors the humidity around the PCU.
S15	4	Original Width	Detects the width of the original. This is one of the APS (Auto Paper Select) sensors.
S16	5	Original Length-1	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.
S17	6	Original Length-2	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.
S18	3	Platen Cover	Informs the CPU whether the platen cover is up or down (related to APS/ARE functions). ARE: Auto Reduce and Enlarge
S19	1	Scanner H.P.	Informs the CPU when the 1st and 2nd scanners are at the home position.
S20	23	Toner Density (TD)	Detects the amount of toner inside the development unit.
Switches			
SW1	21	AC	Supplies power to the copier.
SW2	32	Main	Supplies power to operate the machine.
SW3	13	Right Vertical Guide	Cuts the +5 and +24 Vdc power lines.
SW4	20	Upper Paper Size	Determines what size of paper is in the upper paper tray.
SW5	19	Lower Paper Size	Determines what size of paper is in the lower paper tray.
SW6	26	Front Door Safety	Cuts the +5VLD and +24V dc power lines and detects whether the front cover is open or not.
Magnetic Clutches			
MC1	46	Charge Roller Contact	Controls the touch and release movement of the drum charge roller.
MC2	42	Upper Relay	Drives the upper relay rollers.
MC3	43	Lower Relay	Drives the lower relay rollers.
MC4	40	By-pass Feed	Starts paper feed from the by-pass feed table.
MC5	41	Upper Paper Feed	Starts paper feed from the upper paper tray.

Symbol	Index No.	Description	Note
MC6	44	Lower Paper Feed	Starts paper feed from the lower paper tray.
MC7	39	Registration	Drives the registration rollers.
MC8	38	Development	Drives the development roller.
Solenoids			
SOL1	48	Junction Gate	Moves the junction gate to direct copies to the face up or face down copy tray.
Lamps			
L1	60	Quenching	Neutralizes any charge remaining on the drum surface after cleaning.
L2	2	Scanner	Applies light to the original for exposure.
L3	8	Fusing	Provides heat to the hot roller.
Heaters			
H1	18	Tray (option)	Turns on when the main switch is off to keep paper in the paper tray dry. Tray heaters are also available for the optional paper feed unit.
H2	34	Anti-condensation (option)	Turns on when the main switch is off to prevent moisture from accumulating.
Thermistors			
TH1	24	Charge Roller	Monitors the temperature of the drum charge roller.
TH2	22	Fusing	Monitors the temperature of the hot roller.
Thermofuses			
TF1	7	Fusing	Provides back-up overheat protection in the fusing unit.
Counters			
CO1	25	Total	Keeps track of the total number of copies made.
CO2	---	Key (option)	Used for control of authorized use. The copier will not operate until it is installed.
Others			
LSD1	30	Laser Synchronization Detector	Detects the laser beam at the start of the main scan.
NF	56	Noise Filter (230V machine only)	Removes electrical noise from the AC input line.
CB	57	Circuit Breaker (230V machine only)	Guards against voltage surges in the AC input line.

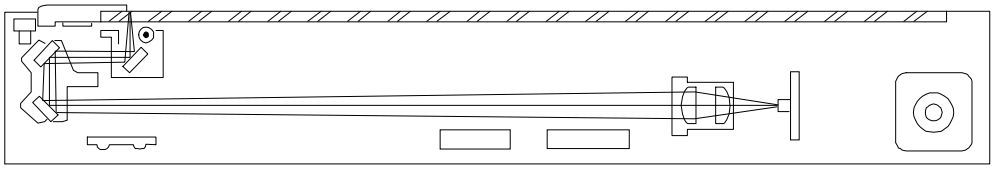
6. DRIVE LAYOUT



1. Scanner Drive Motor
2. Development Clutch
3. Charge Roller Contact
4. Main Motor
5. Registration Clutch
6. Lower Paper Feed Clutch
7. Lower Relay Clutch
8. Upper Relay Clutch
9. Upper Paper Feed Clutch
10. By-pass Feed Clutch

7. COPY PROCESS

7.1 OVERVIEW



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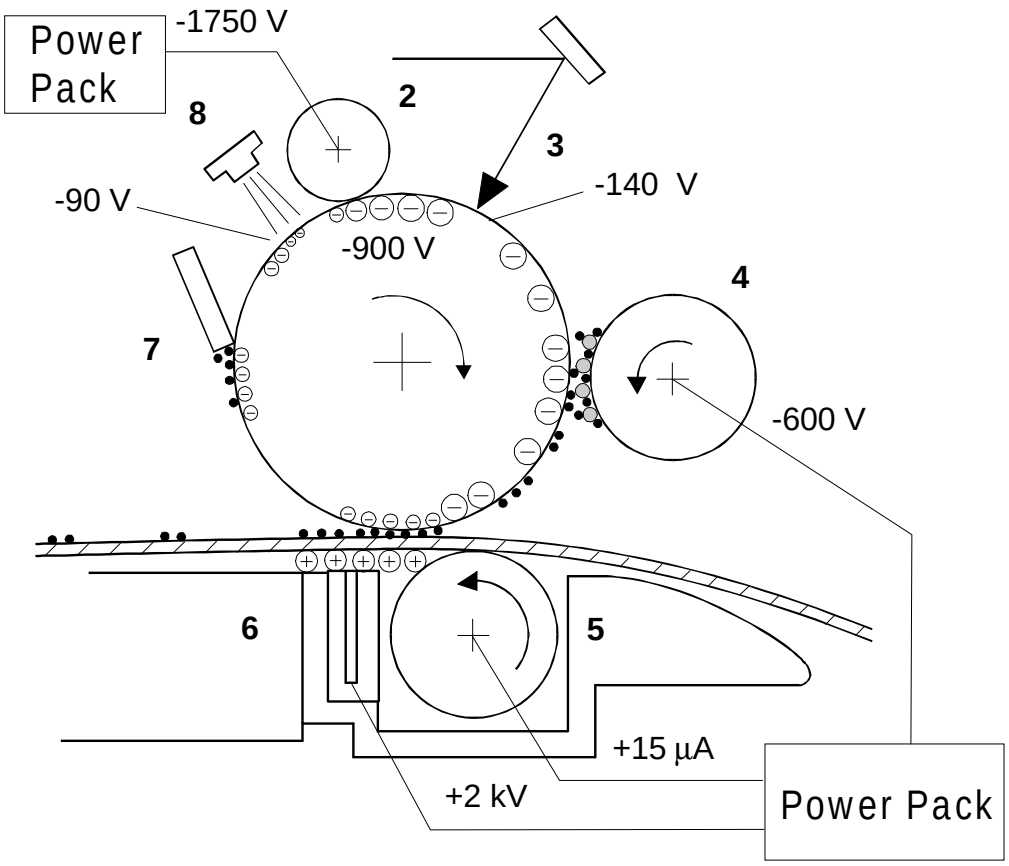

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1. EXPOSURE
A xenon lamp exposes the original. Light reflected from the original passes to the CCD, where it is converted into an analog data signal. This data is converted to a digital signal, processed, and stored in the memory. At the time of printing, the data is retrieved and sent to the laser diode. For multi-copy runs, the original is scanned once only and stored to the memory.

2. DRUM CHARGE
In the dark, the charge roller gives a negative charge to the organic photo-conductive (OPC) drum. The charge remains on the surface of the drum because the OPC layer has a high electrical resistance in the dark.

3. LASER EXPOSURE
The processed data scanned from the original is retrieved from the memory and transferred to the drum by a laser beam, which forms an electrical latent image on the drum surface. The amount of charge remaining as a latent image on the drum depends on the laser beam intensity, which is controlled by the BICU board.

4. DEVELOPMENT
The magnetic developer brush on the development rollers comes in contact with the latent image on the drum surface. Toner particles are electrostatically attracted to the areas of the drum surface where the laser reduced the negative charge on the drum.

5. IMAGE TRANSFER
Paper is fed to the area between the drum surface and the transfer roller at the proper time for aligning the copy paper and the developed image on the drum surface. Then, the transfer roller applies a high positive charge to the reverse side of paper. This positive charge produces an electrical force which pulls the toner particles from the drum surface on to the paper. At the same time, the paper is electrically attracted to the transfer roller.

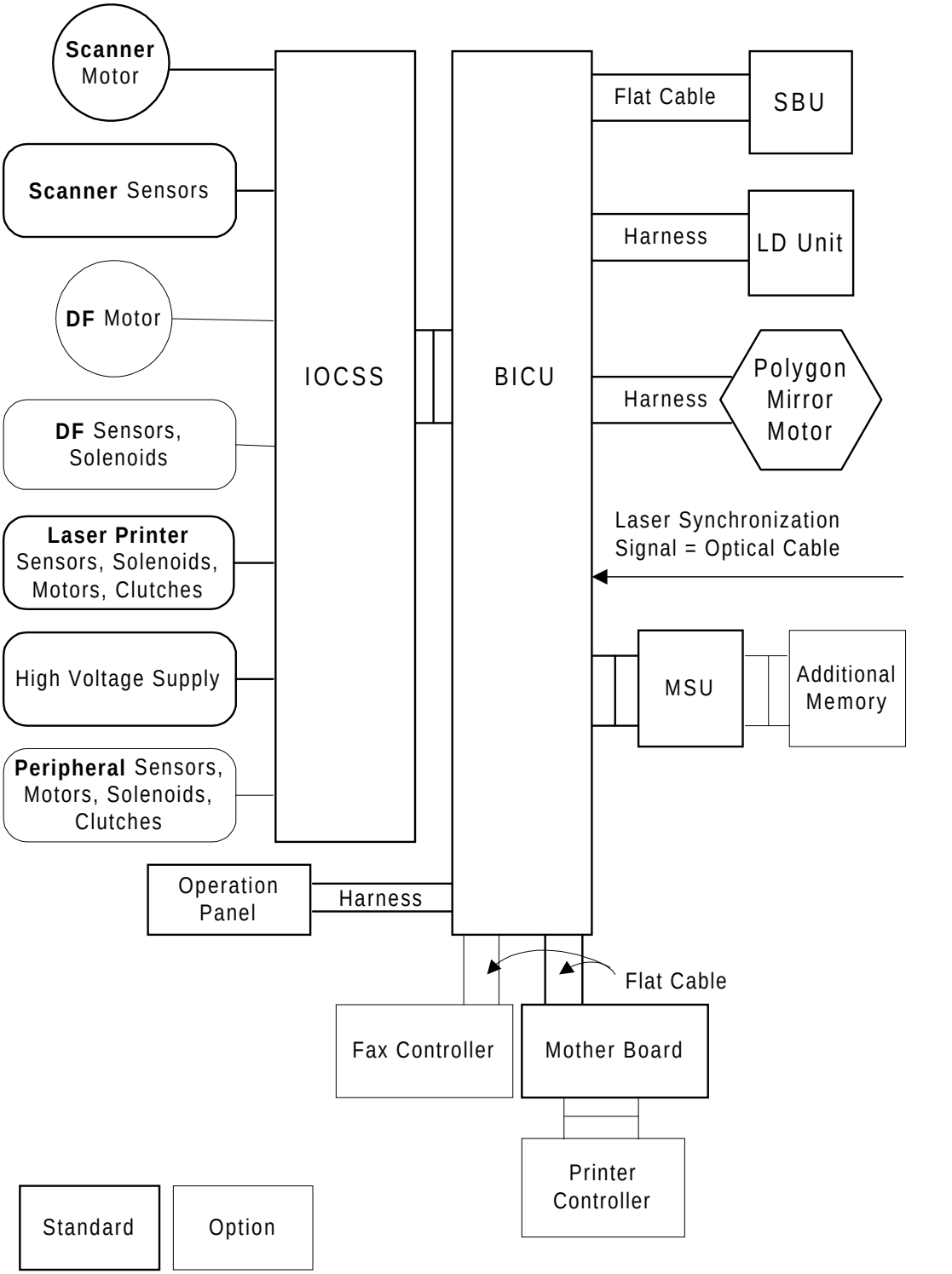
6. PAPER SEPARATION
Paper separates from the drum as a result of the electrical attraction between the paper and the transfer roller. The discharge brush helps separate the paper from the drum.

7. CLEANING
The cleaning blade removes any toner remaining on the drum surface after the image is transferred to the paper.

8. QUENCHING
The light from the quenching lamp electrically neutralizes the charge on the drum surface.

8. BOARD STRUCTURE

8.1 OVERVIEW



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8.2 DESCRIPTION

1. BICU (Base Engine and Image Control Unit)

This is the main board. It controls the following functions:

- Engine sequence
- Scanner, laser printer engine
- Timing control for peripherals
- Image processing, video control
- Operation control
- Corresponding application boards
- Machine control, system control

2. IOCSS (I/O and Customer Support System Unit)

The IOCSS board handles the following functions:

- Drive control for the sensors, motors, solenoids of the printer and scanner
- PWM control for the high voltage control board
- Serial interfaces with peripherals
- Circuit for fusing control

3. SBU (Sensor Board Unit)

The SBU deals with the analog signals from the CCD and converts them into digital signals.

4. MSU (Memory Super-charger Unit)

The MSU stores and compresses the image data. It also does image editing on the data if requested by the user. An extra 4 MB or 8 MB of memory can be added (see below).

5. Additional Memory (Option)

This is an additional image memory board for the MSU.

6. LD Unit

This is the laser diode drive circuit board.

7. Mother Board

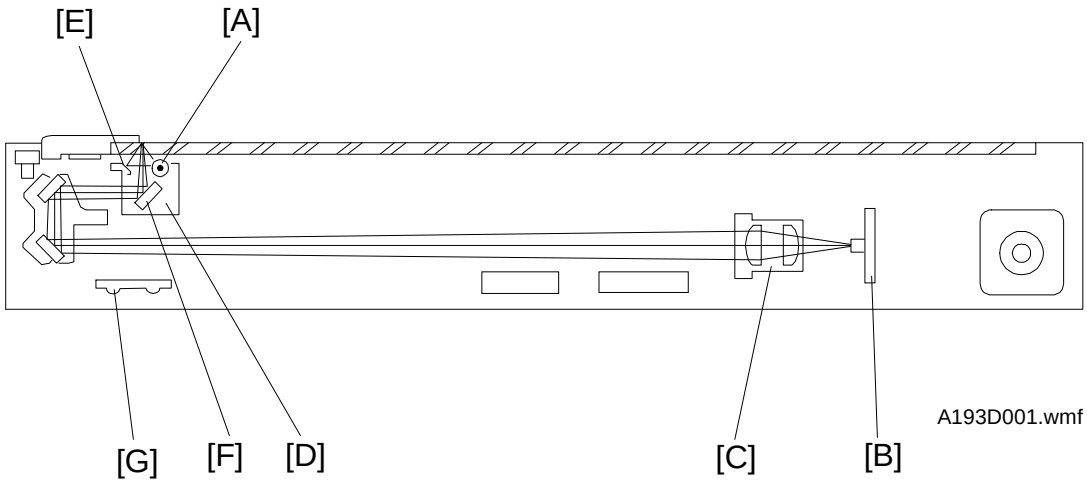
This is the printer control board as well as the BICU interface board. It receives the signals from the printer control board and sends signals to the printer control board.

SECTION 2

DETAILED SECTION DESCRIPTIONS

1. SCANNING

1.1 OVERVIEW



The original is illuminated by the exposure lamp (a xenon lamp in this model) [A]. The image is reflected onto a CCD (charge coupled device) [B] via the 1st, 2nd, 3rd mirrors, and lens [C].

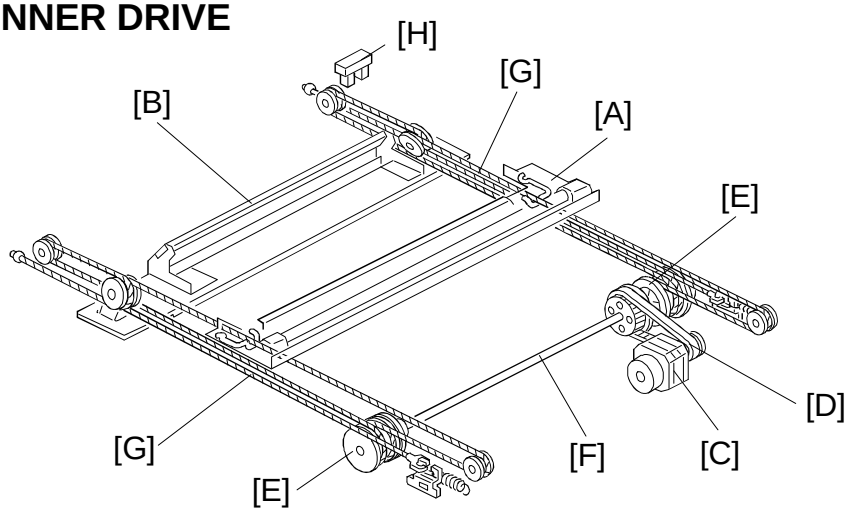
The 1st scanner [D] consists of the exposure lamp, a reflector [E], and the 1st mirror [F].

The exposure lamp is energized by a dc supply to avoid uneven light intensity as the 1st scanner moves in the sub scan direction. The entire exposure lamp surface is frosted to ensure even exposure in the main scan direction.

The light reflected by the reflector is of almost equal intensity, to reduce shadows on pasted originals.

An optics anti-condensation heater [G] is available as an option. It can be installed on the left side of the inner cover. It turns on whenever the power cord is plugged in.

1.2 SCANNER DRIVE



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A stepper motor is used to drive the scanner. The 1st and 2nd scanners [A,B] are driven by this scanner drive motor [C] through the timing belt [D], scanner drive pulley [E], scanner drive shaft [F], and two scanner wires [G].

– Book mode –

The scanner drive board controls and operates the scanner drive motor. In full size mode, the 1st scanner speed is 90 mm/s during scanning. The 2nd scanner speed is half that of the 1st scanner.

In reduction or enlargement mode, the scanning speed depends on the magnification ratio (M: 0.25 to 4.00). The returning speed is always the same, whether in full size or magnification mode. The image length change in the sub scan direction is done by changing the scanner drive motor speed, and in the main scan direction it is done by image processing on the BICU board.

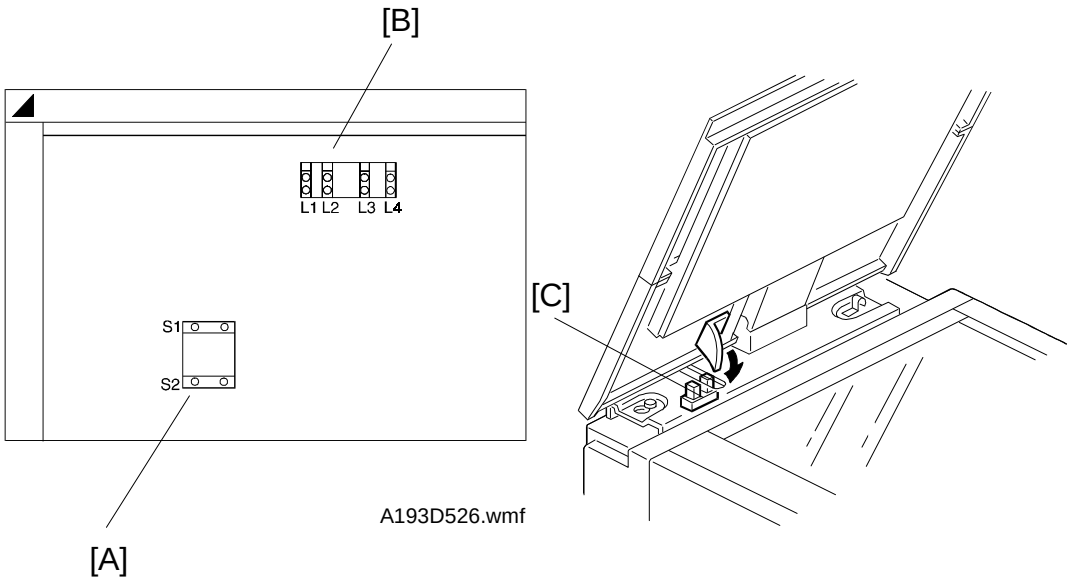
Magnification in the sub-scan direction can be adjusted by changing the scanner drive motor speed using SP4-101. Magnification in the main scan direction can be adjusted using SP4-008.

– ADF mode –

The scanners are always kept at their home position (the scanner H.P sensor [H] detects the 1st scanner) to scan the original. The ADF motor feeds the original through the ADF. In reduction/enlargement mode, the image length change in the sub-scan direction is done by changing the ADF motor speed. Magnification in the main scan direction is done in the BICU board, like for book mode.

Magnification in the sub-scan direction can be adjusted by changing the ADF motor speed using SP6-007. In the main scan direction, it can be adjusted with SP4-008, like for book mode.

1.3 ORIGINAL SIZE DETECTION IN PLATEN MODE



In the optics cavity for original size detection, there are four reflective sensors in the 115V machines, and six reflective sensors in the 230V machines. The Original Width Sensors [A] detect the original width, and the Original Length Sensors [B] detect the original length. These are the APS (Auto Paper Select) sensors. Each APS sensor is a reflective photosensor.

While the main switch is on, these sensors are active and the original size data is always sent to the CPU. However, the CPU checks the data only when the platen cover is opened.

The original size data is taken by the main CPU when the platen cover sensor [C] is activated. This is when the platen is positioned about 15 cm above the exposure glass. At this time, only the sensor(s) located underneath the original receive the reflected light and switch on. The other sensor(s) are off. The main CPU can recognize the original size from the on/off signals from the APS sensors.

If the copy is made with the platen fully open, the main CPU decides the original size from the sensor outputs when the Start key is pressed.

Original Size		Length Sensors				Width Sensors	
A4/A3 version	**LT/DLT version**	L1	L2	L3	L4	S1	S2
A3	11" x 17"	O	O	O	O	O	O
B4	10" x 14"	O	O	O	O	O	X
F4	8 1/2" x 14" (8" x 13")	O	O	O	X	X	X
A4–L	8 1/2" x 11"	O	O	X	X	X	X
B5–L	—	O	X	X	X	X	X
A4–S	11" x 8 1/2"	X	X	X	X	O	O
B5–S	—	X	X	X	X	O	X

O: ON X: OFF

NOTE: The length sensors L3 and L4 are used only for 230V machines.

For other combinations, "CANNOT DETECT ORIG. SIZE" will be indicated on the operation panel display.

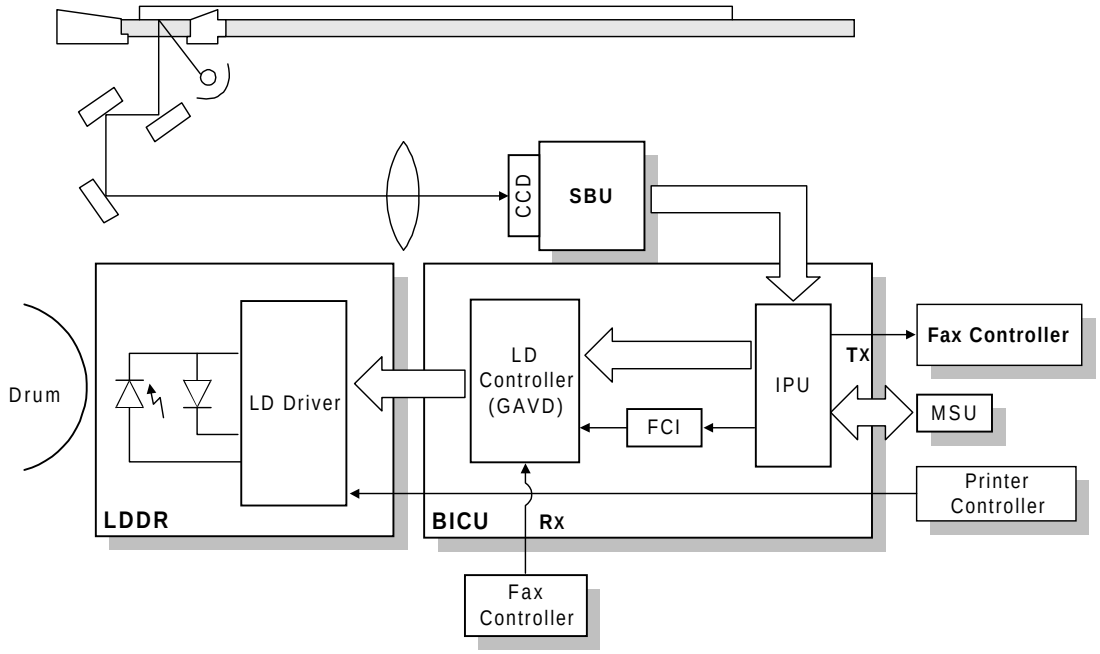
The above table shows the outputs of the sensors for each original size. This original size detection method eliminates the necessity for a pre-scan and increases the machine's productivity.

However, if the by-pass feeder is used, note that the machine assumes that the copy paper is lengthwise. For example, if A4 sideways paper is placed on the by-pass tray, the machine assumes it is A3 paper and scans the full A3 area, disregarding the original size sensors. This can cause excess toner to be transferred to the transfer roller, so users should be instructed to always set the paper lengthwise on the by-pass tray. This problem occurs for the first page only. The registration sensor detects the length of the first page, and will assume that the following sheets of copy paper are the same length.

Original size detection using the ADF is described in the manual for the ADF.

2. IMAGE PROCESSING

2.1 OVERVIEW



A193D501.wmf

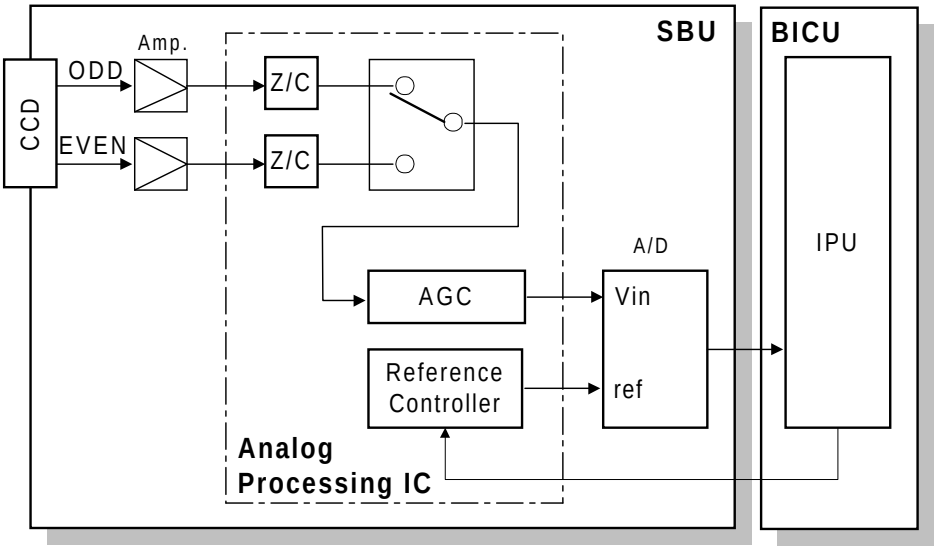
The CCD generates an analog video signal. The SBU (Sensor Board Unit) converts the analog signal to an 8-bit digital signal, then it sends the digital signal to the BICU (Base-engine and Image Control Unit) board.

The BICU board can be divided into three image processing blocks; the IPU (Image Processing Unit), FCI (Fine Character Image), and LD controller (GAVD)

- IPU: Auto shading, filtering, magnification, γ correction, and gradation processing
- FCI: Smoothing (binary picture processing mode only)
- LD controller: LD print timing control and laser power PWM control

Finally, the BICU board sends the video data to the LD drive board at the correct time.

2.2 SBU (SENSOR BOARD UNIT)



Z/C: Zero Clamp
AGC: Automatic Gain Control Circuit

A193D502.wmf

The CCD converts the light reflected from the original into an analog signal. The CCD line has 5,000 pixels and the resolution is 400 dpi (15.7 lines/mm).

The CCD has two output lines, for odd and even pixels, to the analog processing IC. The analog processing IC performs the following operations on the signals from the CCD:

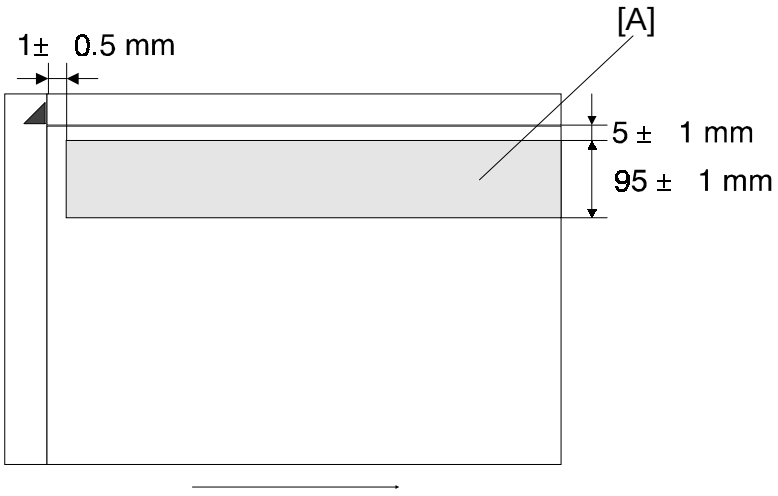
1) Z/C (Zero Clamp):
   Adjusts the black level reference for even pixels to match the odd pixels.

2) Signal Composition:
   Analog signals for odd and even pixels from the CCD are merged by a switching device.

3) Signal Amplification
   The analog signal is amplified by operational amplifiers in the AGC circuit. The maximum gains of the operational amplifiers are controlled by the CPU on the BICU board.

After the above processing, the analog signals are converted to 8-bit signals by the A/D converter. This will give a value for each pixel on a scale of 256 grades. Then, the digitized image data goes to the BICU board.

2.3 AUTO IMAGE DENSITY (ADS)



A193D004.wmf

This mode prevents the background of an original from appearing on copies.

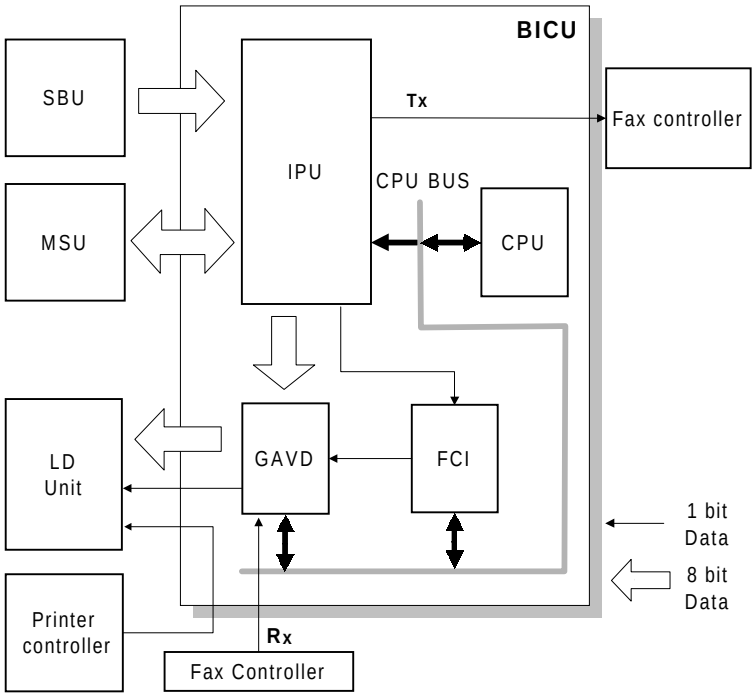
The copier scans the auto image density detection area [A] as shown in the diagram. This corresponds to a few mm at one end of the main scan line. As the scanner scans down the page, the IPU on the BICU detects the peak white level for each scan line. The IPU determines the reference value for the A/D conversion for a particular scan line using the peak white level for that scan line. Then, the IPU sends the reference value data to the reference controller on the SBU.

When an original with a gray background is scanned, the density of the gray area is the peak white level density. Therefore, the original background will not appear on copies. Because peak level data is taken for each scan line, ADS corrects for any changes in background density down the page.

As with previous digital copiers, the user can select manual image density when selecting auto image density mode, and the machine will use both settings when processing the original.

2.4 IPU (IMAGE PROCESSING UNIT)

2.4.1 Overview



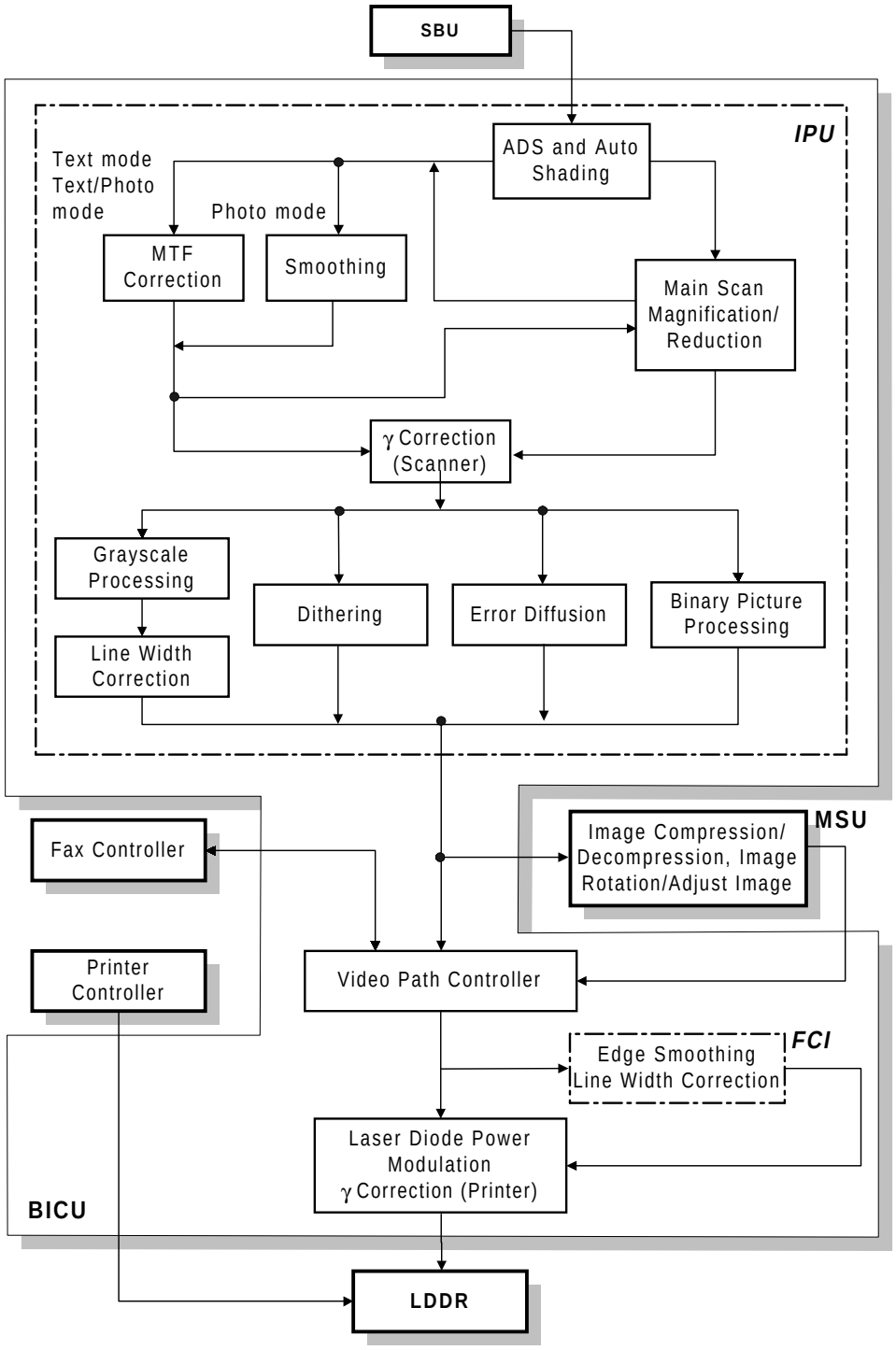
A193D527.wmf

The image data from the SBU goes to the IPU (Image Processing Unit) IC on the BICU board, which carries out the following processes on the image data:

1. Auto shading
2. Filtering (MTF and smoothing)
3. Magnification
4. γ correction
5. Grayscale processing
6. Binary picture processing
7. Error diffusion
8. Dithering
9. Video path control
10. Test pattern generation

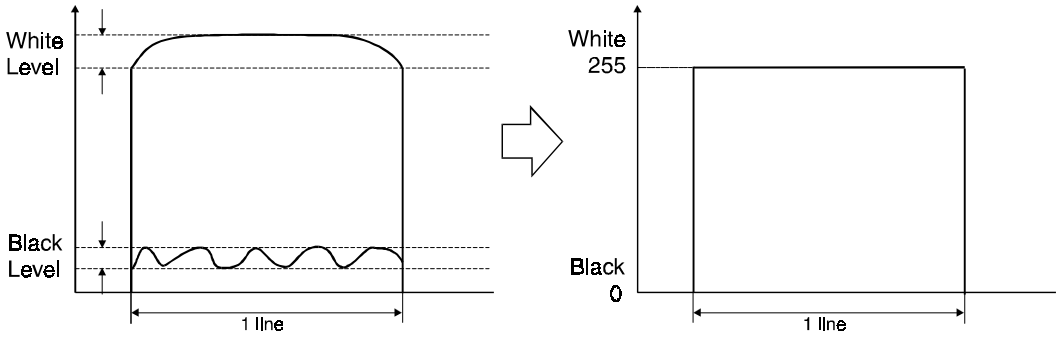
The image data then goes to either the LD controller (GAVD) or the FCI depending on the selected copy modes.

2.4.2 Image Processing Path



A193D506.wmf

2.4.3 Auto Shading



A193D517.wmf

As with the previous digital copiers, there are two auto shading methods. One is black level correction and the other is white level correction. Auto shading corrects errors in the signal level for each pixel.

1) Black Level Correction

The CPU reads the black dummy data from one end of the CCD signal (64 pixels at the end are blacked off) and takes the average of the black dummy data. Then, the CPU deletes the black level value from each image pixel.

2) White Level Correction

Before scanning the original, the machine reads a reference waveform from the white plate. The average of the white video level for each pixel is stored as the white shading data in the FIFO memory in the IPU chip.

The video signal information for each pixel obtained during image scanning is corrected by the IPU chip.

In book mode, auto shading is done at the beginning of each scan.
In ADF mode, auto shading is done at a specific time interval. This interval can be set with SP4-913 (the default setting is 30 seconds). The machine waits until the end of the page before doing the auto shading.

2.4.4 Filtering and Main Scan Magnification/Reduction

1. Overview

After auto shading, the image data is processed by both filtering and main scan magnification. However, to reduce the occurrence of moire in the image, the processing order is different depending on the reproduction ratio, as follows.

1) Reduction and Full size
   Main Scan Reduction → Filtering
2) Enlargement
   Filtering → Main Scan Magnification

2. Filtering

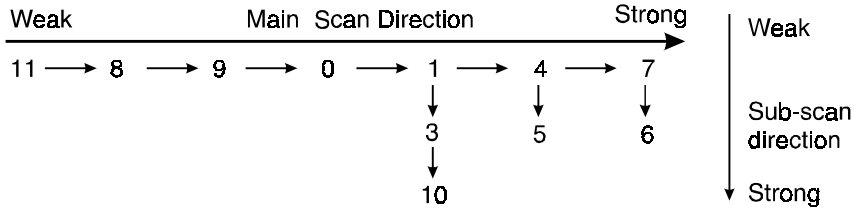
There are two software filters for enhancing the desired image qualities of the selected original mode: the MTF filter and the smoothing filter.

The MTF filter emphasizes sharpness and is used in Text and Text/Photo modes. The smoothing filter is used in Photo mode.

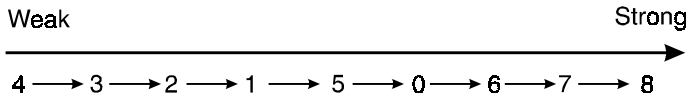
The relationships between the coefficient of the filter and the filter strengths are as follows. Note that these relationships are for copier mode only. Fax mode has its own unique table. (Refer to the fax section.)
The filter strengths for each mode can be adjusted with SP4-407.

NOTE: Never select "1." Abnormal images may result.

- MTF Filter -



- Smoothing Filter -

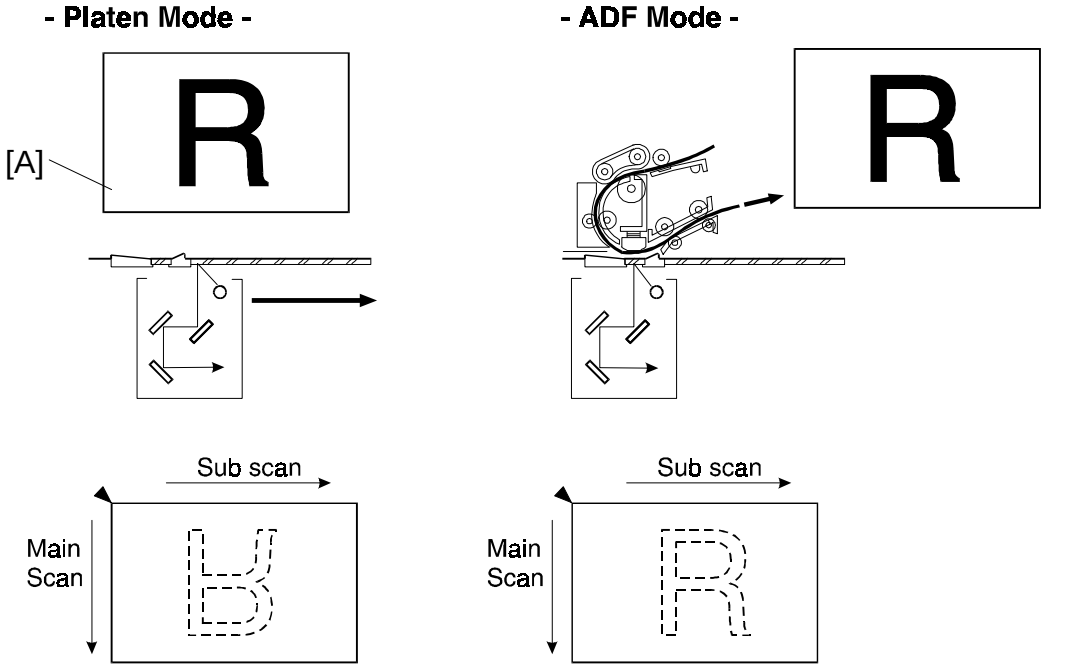


Note: The value is the filter number

A193D503.wmf

3. Main Scan Magnification/Reduction

Reduction and enlargement in the sub scan direction are done by changing the scanner speed. However, reduction and enlargement in the main scan direction are handled by the IPU chip. The processing for main scan magnification/reduction is the same as in the previous digital machines.



A193D504.wmf

When making a copy using the ADF, the magnification circuit creates a mirror image. This is because the scanning starting position in the main scan direction is at the other end of the scan line in ADF mode (as compared with platen mode). In platen mode, the original is placed face down on the exposure glass, and the corner at [A] is at the start of the main scan. The scanner moves down the page. In ADF mode, the ADF feeds the leading edge of the original to the DF exposure glass, and the opposite top corner of the original is at the main scan start position.

To create the mirror image, the CPU stores the main scan line data in the LIFO (Last In First Out) memory of the magnification block, from the last pixel. When loading the main scan line data from the LIFO memory, the CPU loads the first pixel of the main scan line.

2.4.5 Gamma (γ) Correction

Gamma correction ensures accurate generation of the various shades in the gray scale from black to white, accounting for the characteristics of the scanner and printer.

Scanner gamma correction corrects the data output to the IPU to account for the characteristics of the scanner (e.g., CCD response, scanner optics).

Printer gamma correction corrects the data output from the IPU to the laser diode to account for the characteristics of the printer (e.g., the characteristics of the drum, laser diode, and lenses).

The data for the scanner gamma correction is fixed and stored in the memory. The printer gamma correction can be adjusted with SP 2-916.

2.4.6 Gradation Processing

These are four types of gradation processing:

- Grayscale processing: This has 64 output levels for each pixel, and is used only in one-to-one copy mode.
- Binary picture processing: This has only two output levels (black and white), and is used in memory copying (e.g., multiple copy, rotate sort, and editing image) and facsimile transmission.
- Error diffusion: In Text/Photo mode, this is used with either grayscale processing or binary processing.
- Dithering: In Photo mode, this is used with either grayscale processing or binary processing.

These four processes are used as follows.

1) Grayscale processing mode

Text mode:	Grayscale processing
Text/Photo mode:	Grayscale processing + error diffusion
Photo mode:	Grayscale processing + dithering

2) Binary picture processing mode

Text mode:	Binary picture processing
Text/Photo mode:	Binary picture processing + error diffusion
Photo mode:	Binary picture processing + dithering

Copying using the memory (e.g., multiple copying) and fax mode always use binary picture processing. (Users requiring grayscale mode output for multiple copies will have to take a succession of one-to-one copies.)

For one-to-one copying, the processing mode used depends on the setting of SP 4-403. The factory setting is for grayscale processing.

1. Grayscale Processing

As stated on the previous page, this process generates up to 64 image density levels for each pixel. To realize this, this machine uses a form of pulse width modulation. In this machine, pulse width modulation consists of the following processes:

- Laser diode pulse positioning
- Laser diode power/pulse width modulation

Laser diode power and pulse width modulation is done by the laser diode drive board (LDDR), and will be explained in the Laser Exposure section. Briefly, the width of the laser pulse for a pixel depends on the output level (from 0 to 63) required for the pixel.

For each pixel, the location of the active (laser on) part of the pixel can be either at the left side of the pixel, at the center, or at the right side (see fig 2). The machine determines which method to use depending on the settings of SP 2-903. There are different settings for pixels at the left edge, at the right edge, and in the middle of a series of black/grey pixels across the main scan, and for single black pixels with white pixels at the left and right. The edges of characters and lines become clearer with this processing.

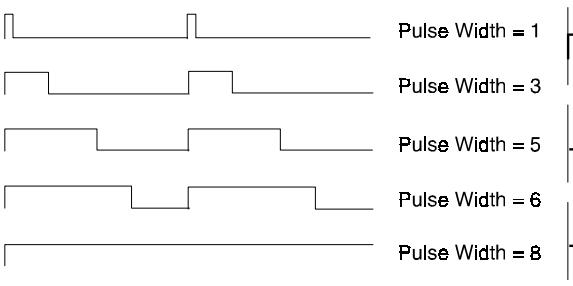


Fig. 1 A193D518.wmf

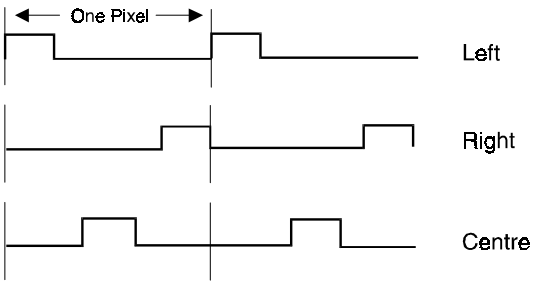


Fig. 2 A193D507.wmf

2. Binary Picture Processing

Each video signal level is converted from 8-bit to 1-bit (black and white image data) in accordance with a threshold value.

The threshold value can be adjusted with SP 4-418.

The printout density of the black pixel depends on the pixel type (left, center, or right of a series, or isolated, in the same way as for grayscale processing). These values can be adjusted with SP2-904.

3. Error Diffusion

This is used only in Text/Photo mode.

The error diffusion process reduces the difference in contrast between light and dark areas of a halftone image. Each pixel is corrected using the difference between it and the surrounding pixels. The corrected pixels are then compared with a error diffusion matrix. Separate error diffusion matrixes are used for copy mode and fax mode.

1) Grayscale processing mode

The output image signal level has 9 levels (from white to black).
There is only one matrix available.

2) Binary picture processing mode

The output image signal level has just 2 levels (white and black).
The threshold level can be changed with SP4-418-2.

4. Dithering

This is only used in Photo mode.

Each pixel is compared with a pixel in a dither matrix. Several matrixes are available, to increase or decrease the detail on the copy.

1) Grayscale processing mode
   The matrix type can be selected with SP4-421-1 and with UP mode.
2) Binary picture processing
   The matrix type can be selected with SP4-421-2 and with UP mode.

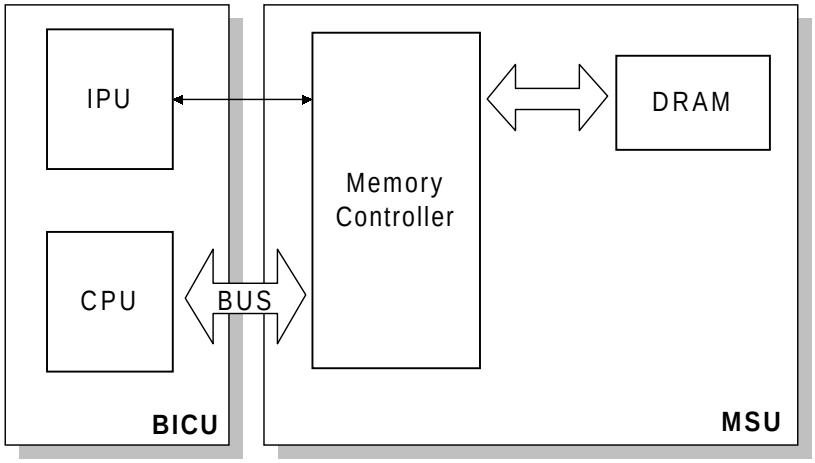
2.4.7 Line Width Correction

This function is effective only in Letter mode.

Usually, lines will bulge in the main scan direction as a result of the negative/positive development system that is used in this model. So, pixels on edges between black and white areas are compared with adjacent pixels, and if the pixel is on a line, the line thickness will be reduced.

The line width correction in grayscale processing mode is done in the IPU, and in binary processing mode, it is done in the FCI chip.

2.5 MSU (MEMORY SUPER-CHARGER UNIT)



A193D528.wmf

The MSU consists of the memory controller and the DRAM. The functions of each device are as follows.

Memory Controller: Compressing the 1-bit image data
Image rotation
Image data transfer to the DRAM

DRAM (standard 4MB): Stores the compressed data (2 MB)
Working area (2 MB)

The data which was treated with binary picture processing goes to the MSU. The data is first compressed using the MMR process and the compressed data is stored in the DRAM. When printing, the data from the DRAM goes back to the memory controller, where the data is decompressed and image editing is done (e.g., image rotation, repeat image, combine image).

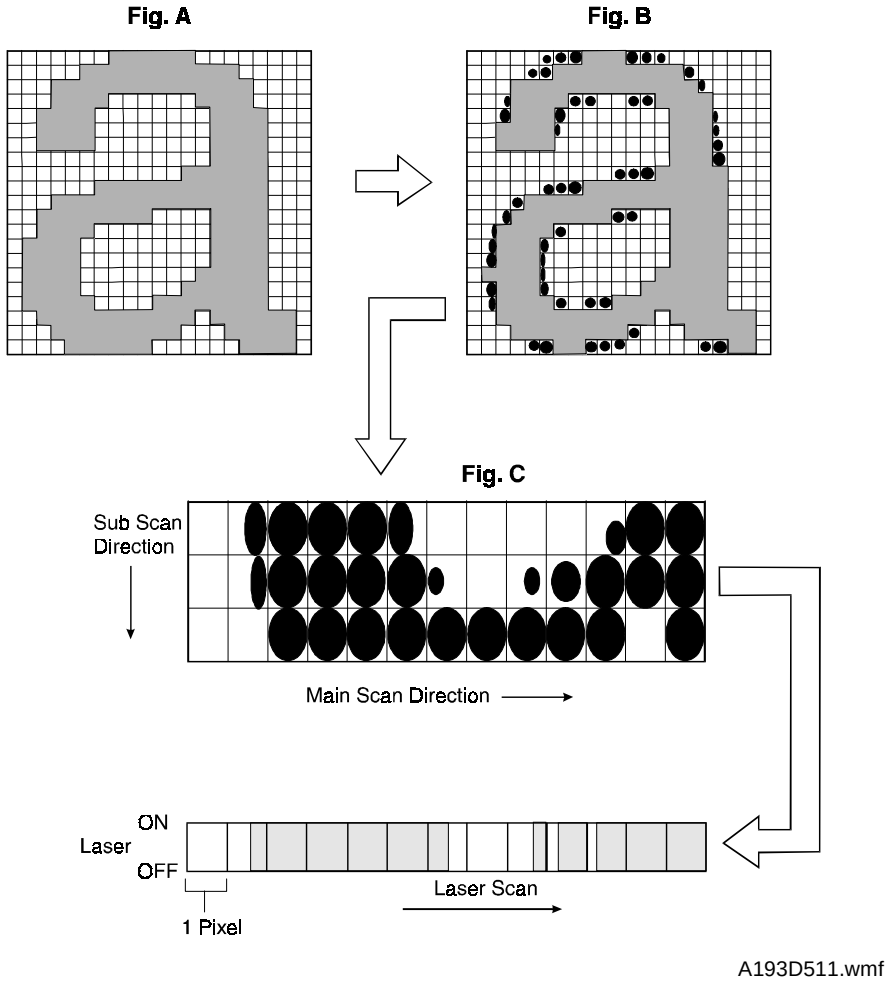
The memory capacity changes when optional memory is installed on the MSU board. The copier functions for each memory combination are as follows.

		Standard (4 MB)	Optional 4 MB	Optional 8 MB
Multi duplex copy		X	O	O
Sort, Rotate Sort	A4, LT	O	O	O
	B4, LG	X	O	O
	A3, DLT	X	O	O
Number of pages	A4 6%	35	99	99
	ITU-T#4 (12% black)	15	45	75

X: Not Available O: Available

2.6 FCI (FINE CHARACTER AND IMAGE)

The FCI performs image smoothing and line width correction. These functions only affect binary picture processed images in Letter mode. The fax board and the printer controller each have independent smoothing circuits.



Usually, binary picture processing generates jagged edges on characters as shown in the above left illustration. The FCI reduces jagged edges of characters using the image smoothing process.

Whether or not the object pixel undergoes smoothing depends on the surrounding image data. The smoothing process for the object pixel is done by changing the laser pulse positioning and the laser power.

FCI smoothing can be switched on or off with SP 2-902.

3. LASER EXPOSURE

3.1 OVERVIEW

This machine uses a laser diode to produce electrostatic images on an OPC drum. The laser diode unit converts image data from the BICU board into laser pulses, and the optical components direct these pulses to the drum.

To produce a high quality copy image, these are 64 gradations for the laser pulses, controlled through power modulation and pulse width modulation.

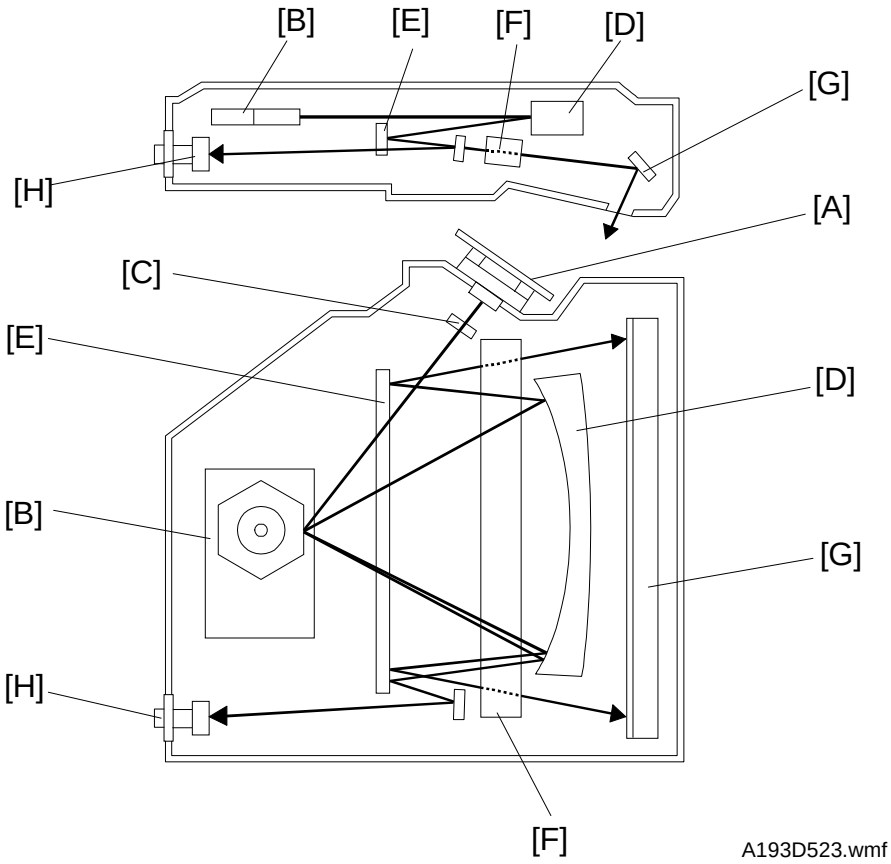
Exposure of the drum by the laser beam creates the latent image. The laser beam makes the main scan while drum rotation controls the sub scan.

The strength of the beam is 0.6 mW on the drum surface at a wavelength of 780 nm.

There are four polygon motor speeds:

Resolution (dpi)	Modes	Motor Speed (rpm)	Data Frequency (MHz)
400 dpi	Copy, Fax, and Printer	14173.23	9.276
600 dpi	Printer	21259.84	20.872
391.16 dpi	Fax (Image rotation)	13860.00	9.216
406.4 dpi	Fax (mm printing)	14400.00	9.216

3.2 OPTICAL PATH



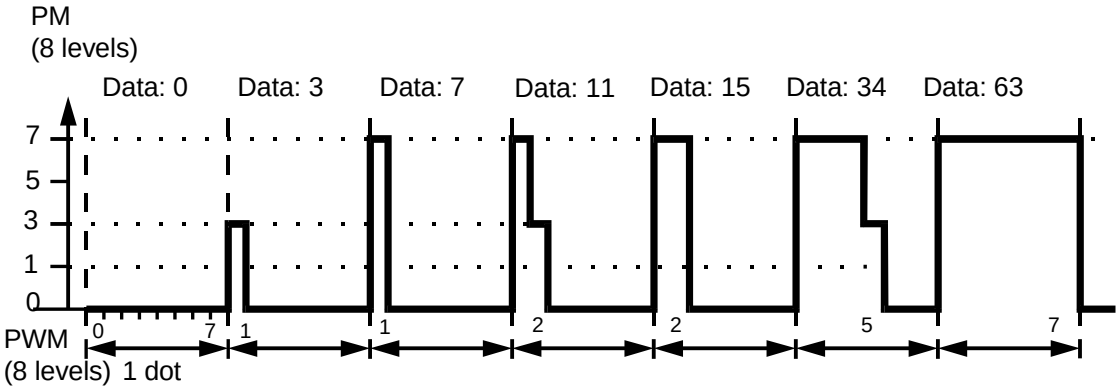
The output path from the laser diode to the drum is shown above.

The LD unit [A] outputs the laser beam to the polygon mirror [B] through the cylindrical lens [C].

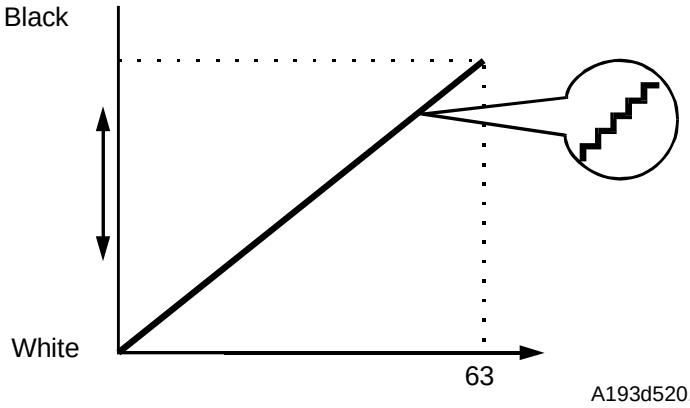
Each surface of the polygon mirror reflects a full main scan line. The laser beam goes to the F-theta mirror [D], 1st mirror [E], and BTL [F]. The 2nd mirror [G] reflects the laser beam to the drum through the toner shield glass.

The laser synchronizing detector [H] determines the main scan starting position.

3.3 GRADATION CONTROL (LASER POWER MODULATION)



A193D519.wmf



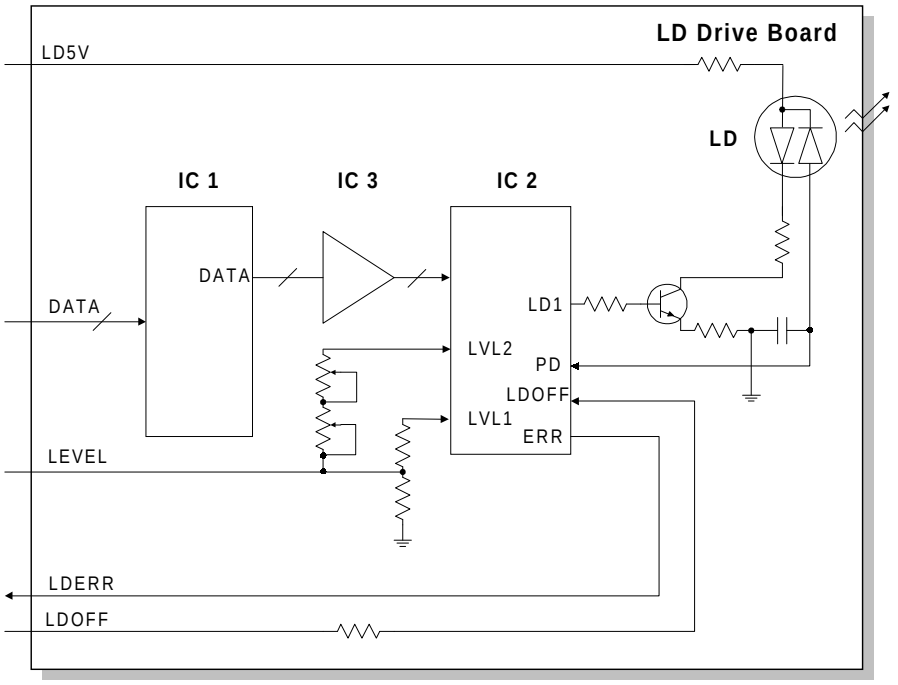
A193d520.wmf

To make the latent image, the laser beam illuminates the image area of the drum surface. The longer the laser is on and the stronger its intensity is, the darker the developed pixel becomes. Modulating (changing) the width of the pulse makes the on time of the laser longer or shorter (PWM). There are eight pulse width levels in this model.

While the laser is on to make one dot, the intensity of the laser is controlled by power modulation (PM). The laser's intensity is controlled by the amount of current sent to the laser diode. Modulating the power makes the laser brighter or dimmer. There 8 power levels, or laser intensity levels. The power is modulated only on the final part of the laser pulse (example: see data 11 in the diagram).

The machine uses the 8 pulse width levels and 8 power levels to create the 64 possible grayscale values for each pixel.

3.4 AUTO POWER CONTROL (APC)



A193D521.wmf

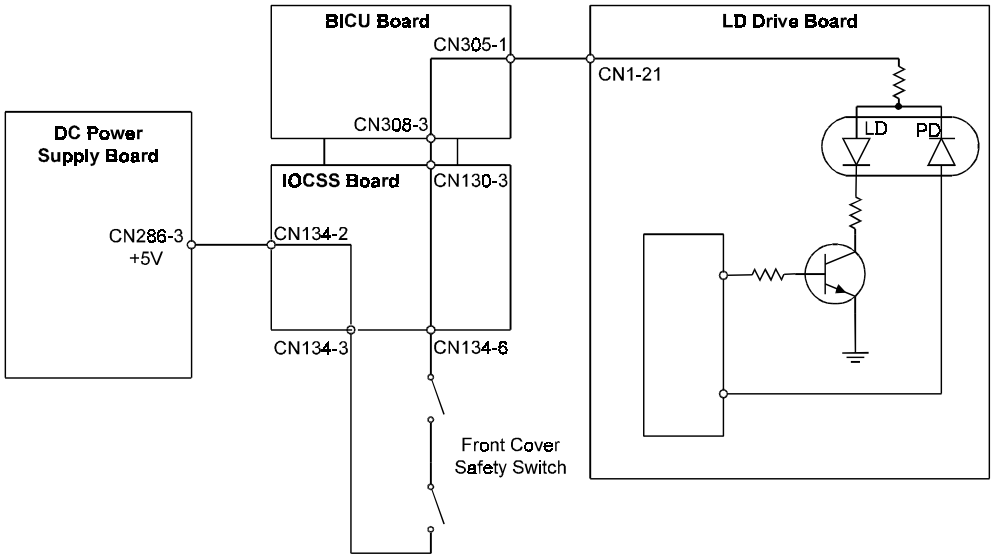
Even if a constant electric current is applied to the laser diode, the intensity of the output light changes with the temperature. The intensity of the output decreases as the temperature increases.

In order to keep the output level constant, the output light intensity is monitored through a photodiode (PD) enclosed in the laser diode. The photodiode passes an electrical current that is proportional to the light intensity. The output is not affected by temperature, so it faithfully reflects the changes in the LD output, without adding anything itself.

Just after the machine is turned on, IC2 on the laser drive board excites the laser diode at full power and the output of the photodiode is stored as a reference in IC2. IC2 monitors the current passing through the photodiode (PD). Then it increases or decreases the current to the laser diode as necessary, comparing it with the reference level (LVL2). Such auto power control is done during printing while the laser diode is active.

The laser diode level is adjusted on the production line. Do not touch the variable resistors on the LD unit in the field.

3.5 LD SAFETY SWITCHES



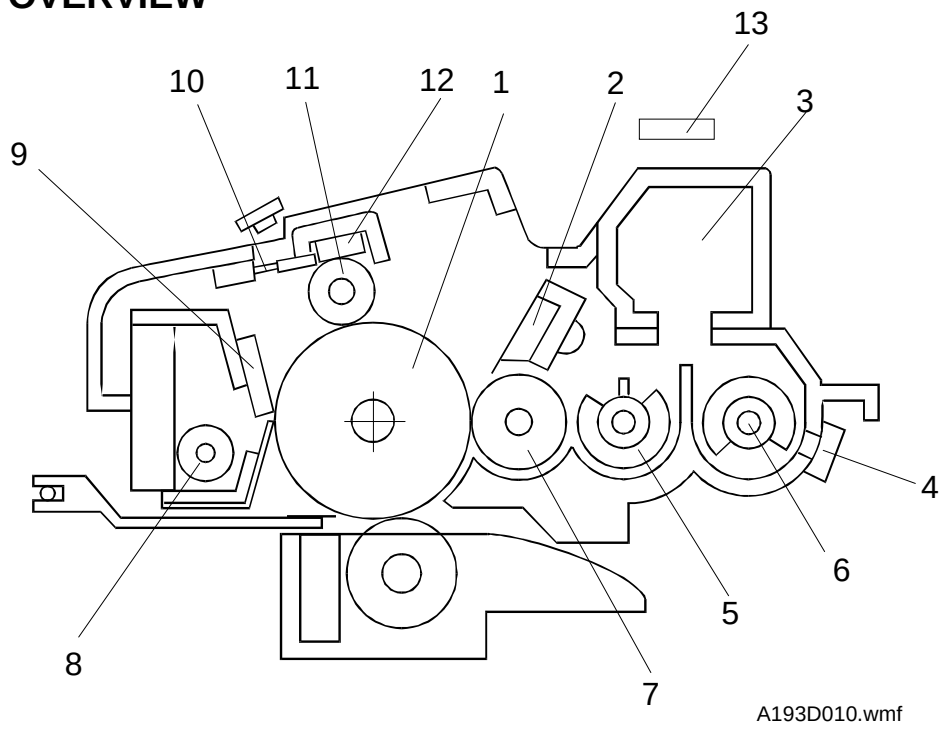
A193D008.wmf

To ensure that the laser beam does not inadvertently expose the drum during servicing, there are two safety switches located at the front cover. These two switches are installed in series on the LD5 V line coming from the dc power supply board.

When the front cover is opened, the power supply to the laser diode is interrupted.

4. PCU (PHOTOCONDUCTOR UNIT)

4.1 OVERVIEW

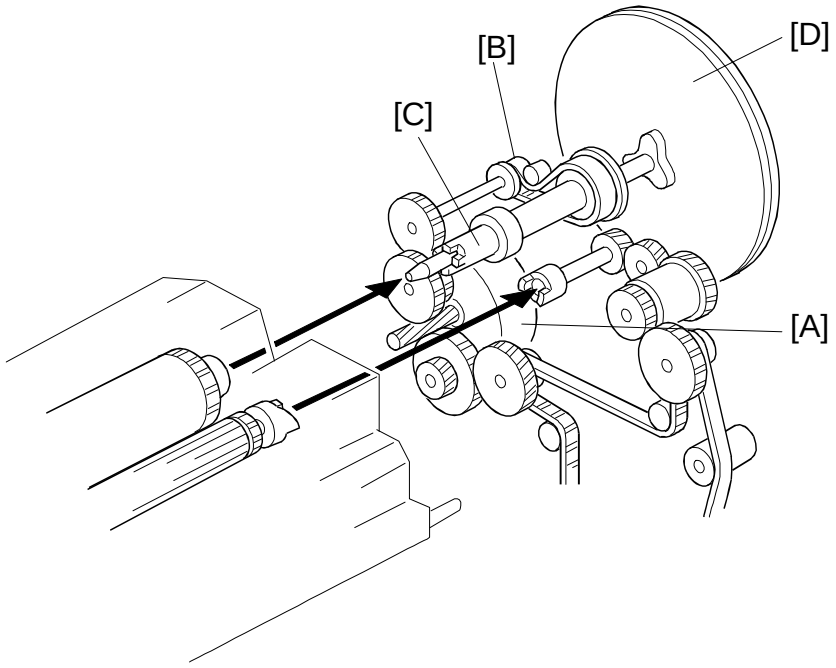


The PCU consists of the components shown in the above illustration. An organic photoconduntor (OPC) drum (diameter: 30 mm) is used in this machine.

1. OPC Drum
2. Doctor Blade
3. Developer Cartridge
4. TD Sensor
5. Mixing Auger 1
6. Mixing Auger 2
7. Development Roller
8. Toner Collection Coil
9. Cleaning Blade
10. Charge Roller Thermistor
11. Charge Roller
12. Charge Roller Cleaning Pad
13. Humidity Sensor

The output of the humidity sensor is used for toner density control processing.

4.2 DRIVE MECHANISM

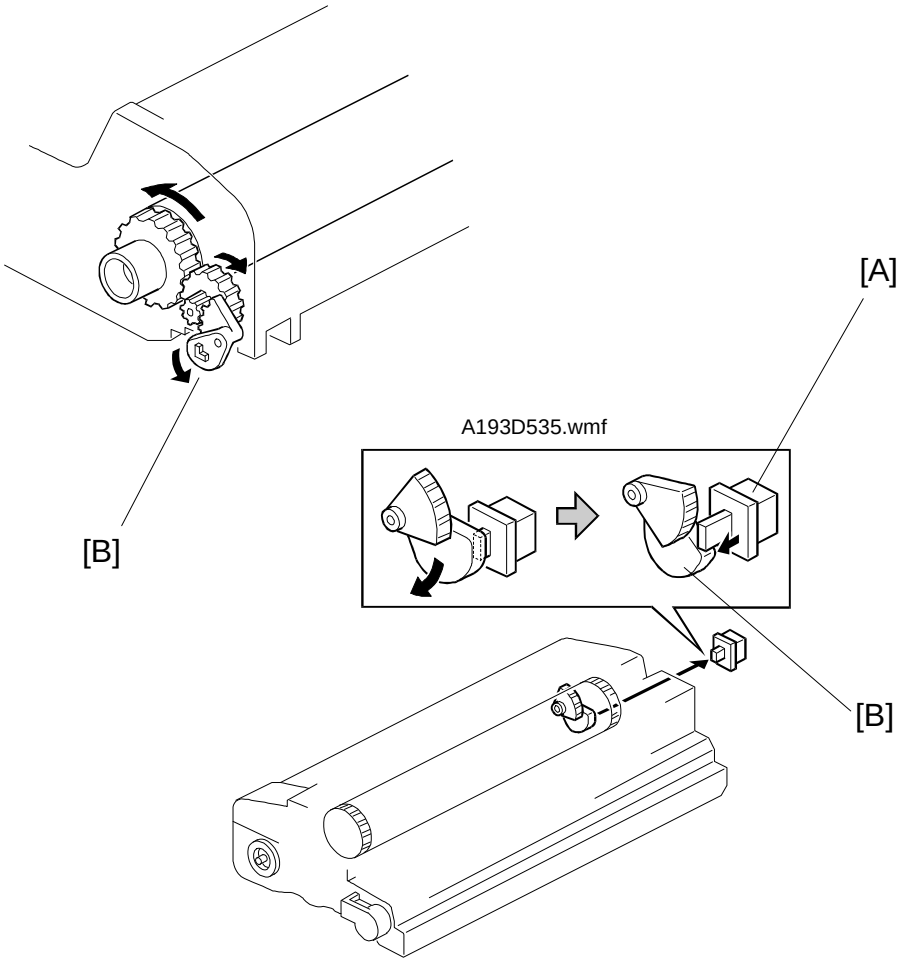


A193D542.wmf

The drive from the main motor [A] is transmitted to the drum through a series of gears, a timing belt [B], and the drum drive shaft [C]. The main motor has a drive controller, which outputs a motor lock signal when the rotation speed is out of the specified range.

The fly-wheel [D] on the end of the drum drive shaft stabilizes the rotation speed (this prevents banding and jitter from appearing on copies).

4.3 NEW PCU DETECTION MECHANISM



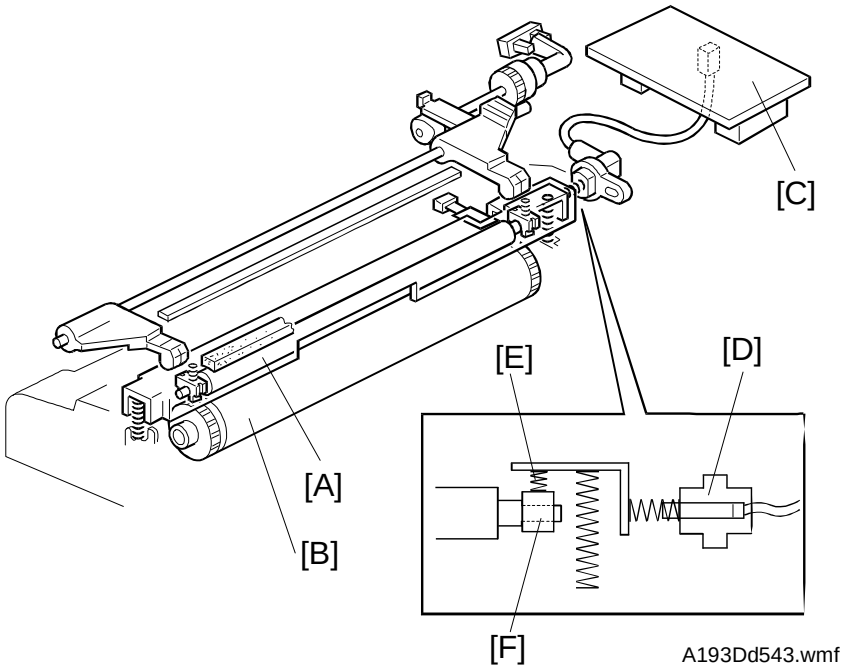
A193D536.mwf

The PCU sensor [A] detects when a new PCU is installed. Each PCU has an actuator. When a new PCU is installed in the machine, the actuator [B] pushes the PCU sensor. The actuator is a sector gear, and this gear engages with the drum gear. When the drum rotates, the actuator is released from the drum gear. The actuator drops away from the PCU sensor and remains in this "down" position for the duration of the PCU's life.

The machine recognizes when a new PCU has been installed in the machine because the actuator of the new PCU contacts the PCU sensor. After the front cover is closed, the machine then performs the TD sensor initial setting procedure automatically (for about two minutes). During this time, the drum rotates and the actuator drops away from the sensor.

4.4 DRUM CHARGE

4.4.1 Overview



This copier uses a drum charge roller system instead of a corona wire scorotron system to charge the drum. For the copy image area or during roller cleaning, the drum charge roller [A] contacts the surface of the drum [B] to give it a negative charge.

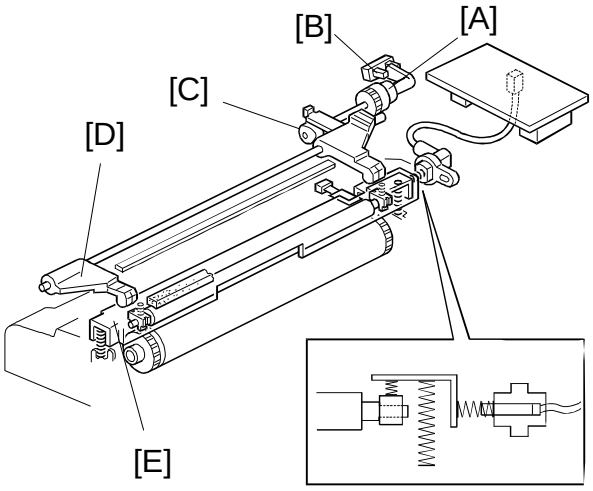
The drum charge roller system has the following advantages over the corona wire scorotron charge system.

- The amount of ozone generated during drum charging is less than about 1/10 of that for a corona wire scorotron system.
- The applied voltage is 1/2 ~ 1/3 that of a corona wire scorotron system.
- The efficiency of drum charge is high.

Due to these advantages, no ozone filter is required in this copier.

The high voltage supply board [C] gives a negative dc voltage to the drum charge roller through the charge roller terminal [D], rear pressure spring [E], and the rear roller bushing [F]. This gives the drum surface a negative charge of –900 V.

4.4.2 Charge Roller Contact Mechanism



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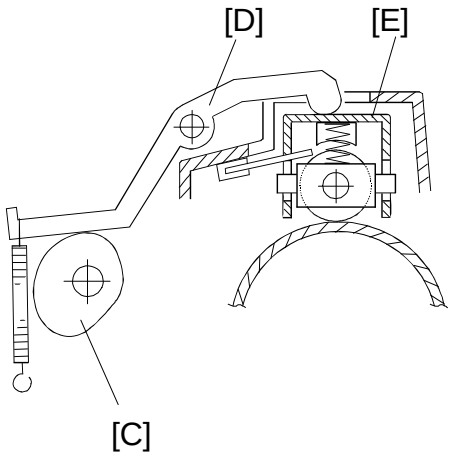

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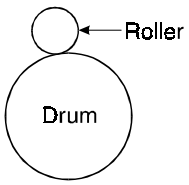
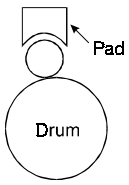
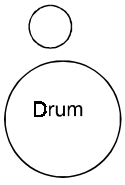
To prevent toner from adhering to the drum charge roller and to prevent the drum charge roller from sticking to the drum, the drum charge roller contacts the drum only under the following conditions:

- When the image processing area comes under the drum charge roller
- During charge roller cleaning

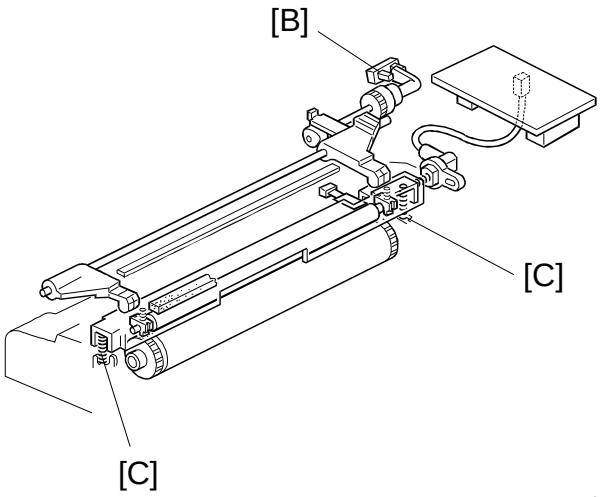
This function is performed by the charge roller contact clutch [A] (a one-third turn clutch) charge roller H.P. sensor [B], and cam [C] located at the end of the clutch shaft. When the clutch is driven one third of a complete rotation, the pressure lever [D] riding on the cam presses down the drum charge roller unit [E] to contact the roller with the drum.

When the drum charge roller contacts the drum, the drum charge roller is turned by the drum.

The following table shows the relationship between the clutch rotation and each processing mode.

Mode	Copying	Cleaning (see next page)	Home Position
Clutch	1/3 turn	1/3 turn	1/3 turn
Charge Roller Position			
Charge Roller Contact H.P. Sn	OFF	OFF	ON

4.4.3 Drum Charge Roller Cleaning



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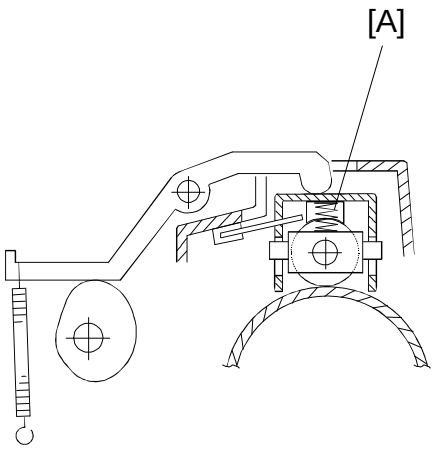

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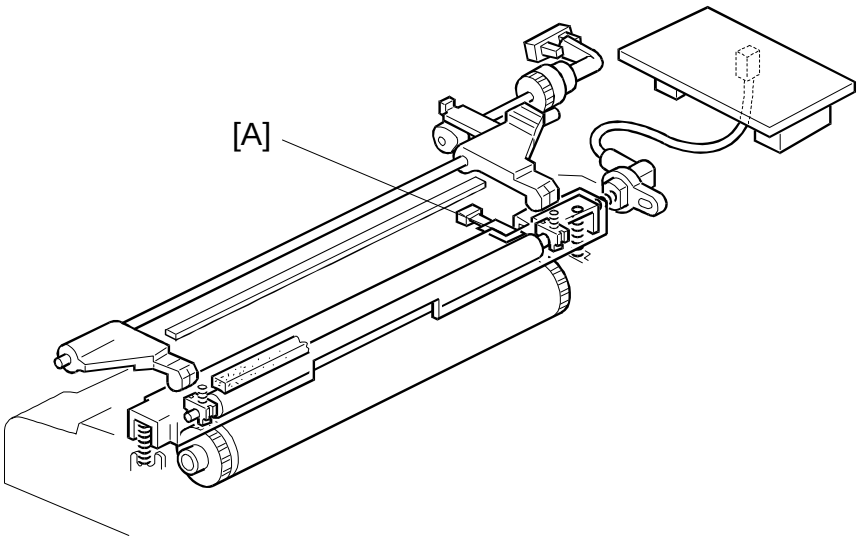
If the drum charge roller gets dirty, drum charge efficiency decreases. This affects the copy quality, for example causing vertical black lines.

Drum charge roller cleaning is done for 2 seconds after every copy job.

After the copy job, the charge roller contact clutch is driven another third of a rotation (see the diagram at the bottom of the previous page). The pressure lever presses down more, so that the cleaning pad [A] contacts the charge roller.

After charge roller cleaning, the clutch is driven the final third of the rotation (until the charge roller H.P sensor [B] is activated) to release the charge roller from the drum. The pressure lever moves away from the charge roller unit. Then the charge roller unit is released from the drum by the spring [C].

4.4.4 Temperature Compensation



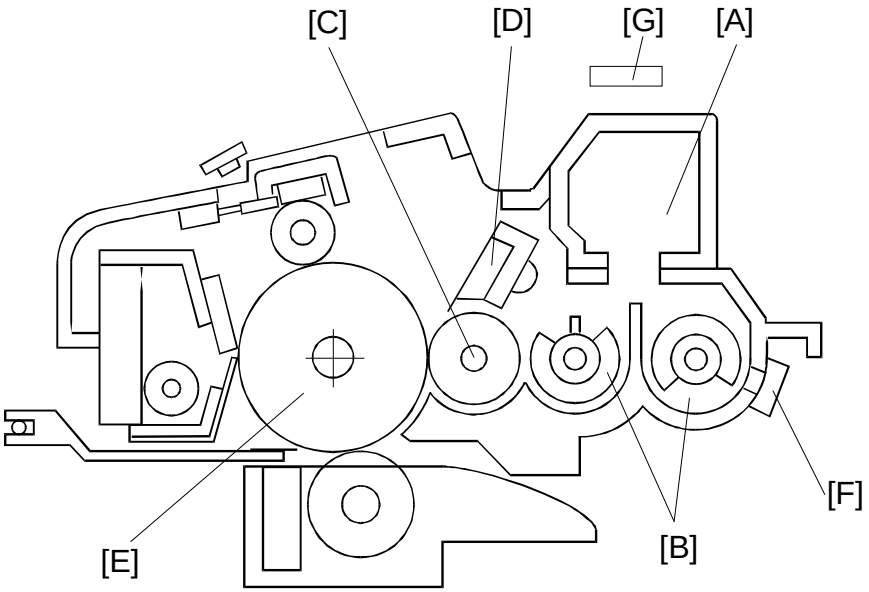
A193D012-3.wmf

The voltage transferred from roller to drum varies with the temperature around the drum charge roller. The lower the temperature is, the higher the applied voltage required.

To compensate for this, the drum charge thermistor [A] detects the temperature around the drum charge roller. Before the copy job starts, the CPU monitors the temperature and instructs the high voltage supply board to correct the charge voltage in accordance with the temperature.

4.5 DEVELOPMENT

4.5.1 Overview



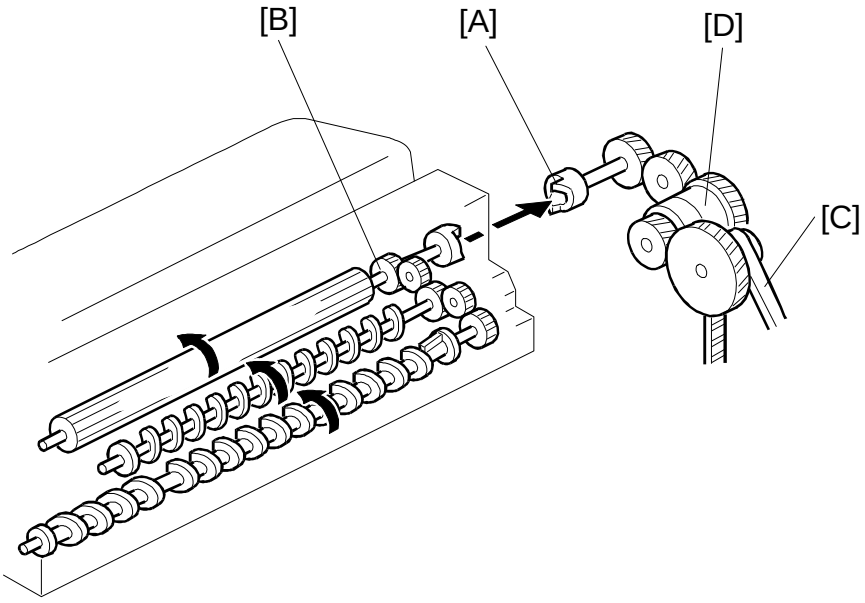
A193D010-3.wmf

This copier uses a single roller development system.

The developer cartridge [A], which includes the developer, is just above the development unit section of the PCU. At machine installation, the developer falls into the development unit. The mixing augers [B] transport the developer and toner to the development roller [C]. Internal permanent magnets in the development roller attract the developer to the development roller sleeve. The development roller carries the developer past the doctor blade [D]. The doctor blade trims the developer to the desired thickness and creates backspill into the mixing mechanism. The development roller continues to turn, carrying the developer to the drum [E] where the latent image is developed.

The toner density sensor [F], located on the side of the development unit, measures the toner concentration in the developer. The humidity sensor [G] measures the humidity level around the drum.

4.5.2 Drive Mechanism

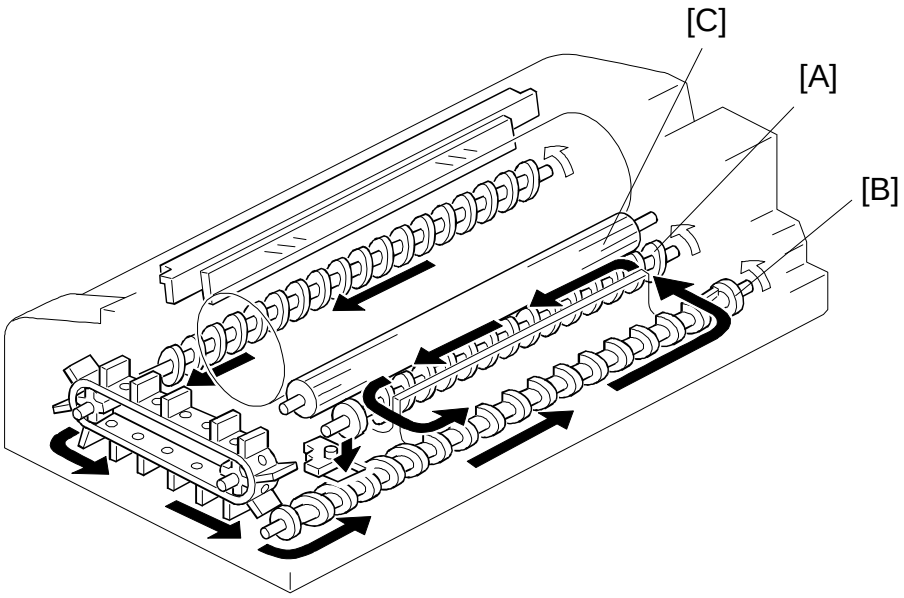


A193D017.wmf

When the development clutch [D] turns on, main motor drive is transmitted to the development drive shaft [A] and the development drive gear [B] through a timing belt [C], and a train of gears.

The development drive gears (except for the gears in the development unit) are helical gears. These gears are quieter than normal gears. When the PCU is pushed in, the development drive shaft engages the development roller gear.

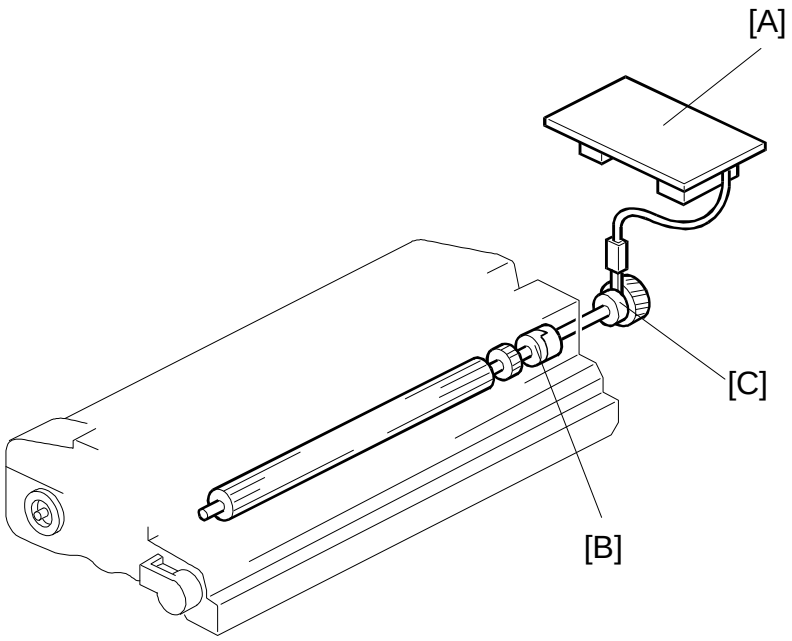
4.5.3 Mixing



A193D016.wmf

This copier uses 2 mixing augers, [A] and [B], to keep the developer evenly mixed. Mixing auger 1 [A] transports excess developer, scraped off the development roller [C] by the doctor blade, towards the front of the machine. Mixing auger 2 [B] returns the excess developer, along with new toner, to the rear of the mixing assembly. Here the developer is reapplied to the development roller.

4.5.4 Development Bias



A193D534.wmf

This machine uses a negative-positive development system, in which black areas of the latent image are at a low negative charge (about -140 ± 50 V) and white areas are at a high negative charge (about -900 V).

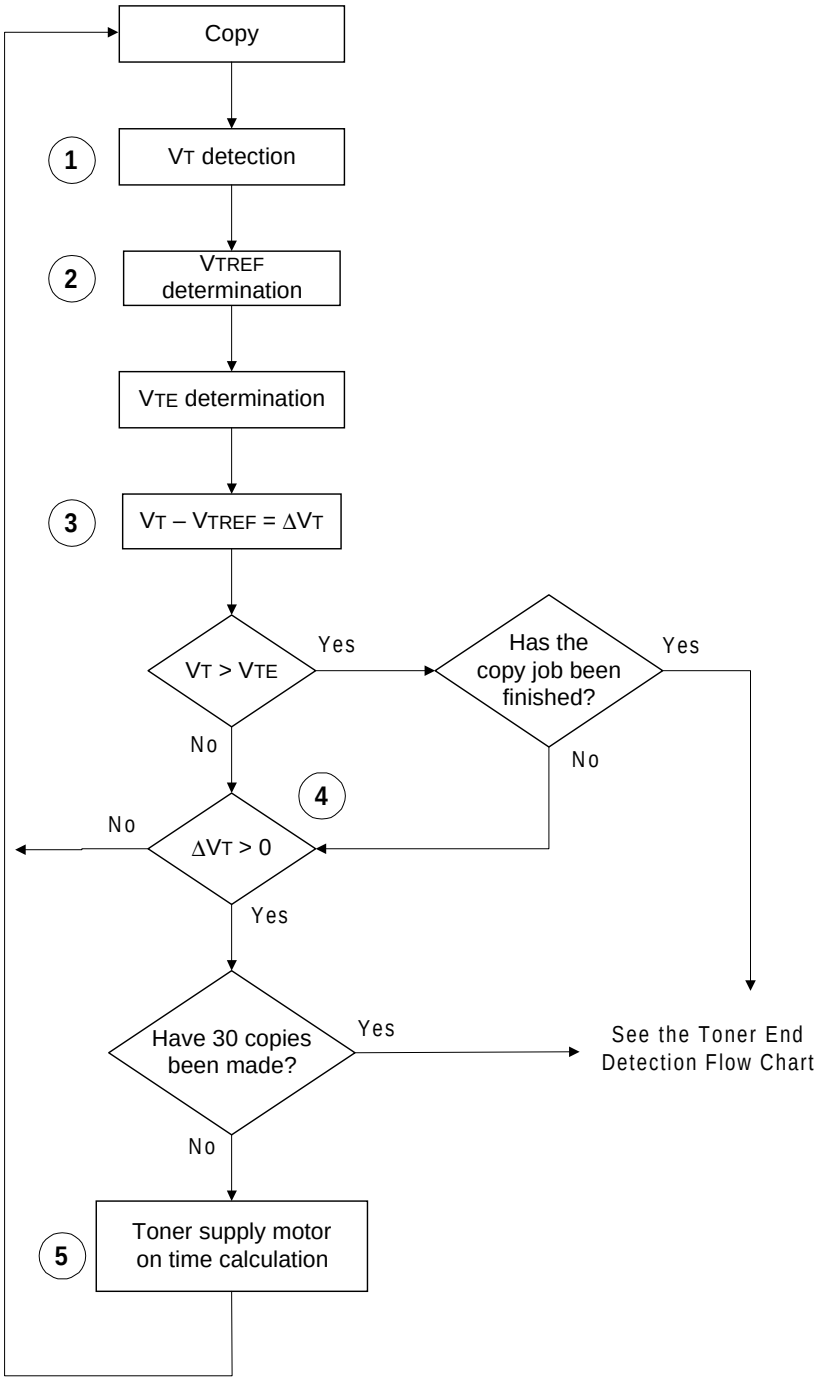
To attract negatively charged toner to the black areas of the latent image on the drum, the high voltage supply board [A] applies a bias of -600 volts to the development rollers throughout the image development process. The bias is applied to the development roller shaft [B] through that shaft's gear [C].

The development bias is kept at 0V until the latent image comes to the development roller. This is to prevent toner from transferring to the area of drum near the development roller, which has not yet been charged. The development bias is then increased to -600 V at the same time as the development clutch turns on.

The development bias voltage (-600 V) can be adjusted with SP2-201.

4.5.5 Toner Density Control

- Toner Density Control Flow Chart -



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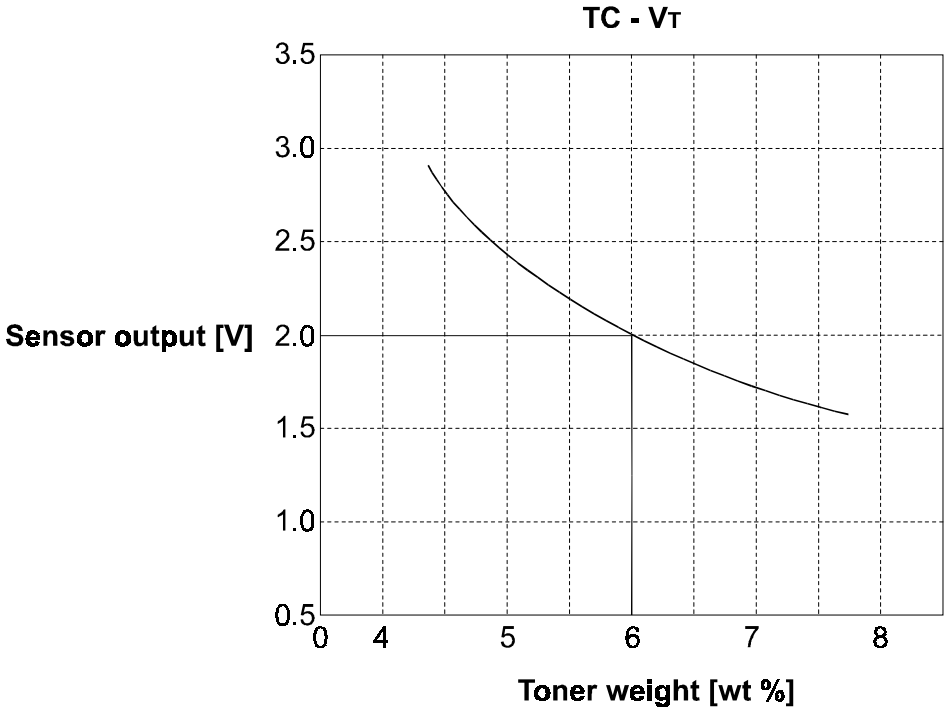
Each step is explained in more detail on the following pages.

- Toner Density Sensor -



A193D522.wmf

Developer consists of carrier particles (ferrite) and toner particles (resin and pigment). Inside the development unit, developer passes through a magnetic field created by coils inside the toner density sensor, When the toner concentration changes, the voltage output of the sensor changes accordingly.

The output from the sensor (V_T) is checked before every copy. The machine tries to keep V_T constant by varying the toner supply, as shown in the flow chart on the previous page.

- Toner Density Sensor Initial Setting -

The TD sensor initial setting procedure is performed in the factory. During TD initial setting, the machine calibrates the TD sensor control voltage (V_{CONT}) so that the TD sensor output voltage is 2.0 ± 0.1V using new developer with a standard toner concentration (6% by weight, 21.6 g of toner in 360 g of developer). This factory-adjusted value will be used for toner density control processing.

- Toner Density Measurement -

Toner density in the developer is detected once every copy cycle (point "1" on the flow chart). The sensor output voltage (V_T) during the detection cycle is compared with the toner supply reference voltage (V_{TREF}).

- Toner Supply Reference Voltage (V_{TREF}) Determination -

The toner reference voltage (V_{TREF}) is the TD sensor initial setting voltage, corrected for humidity as detected by the humidity sensor (point "2" on the flow chart). To change the image density, the humidity correction coefficient for V_{TREF} can be changed using SP 2-911 (there are five settings). The larger the value entered in this SP mode, the lighter the copies will be.

- Toner Supply Determination -

V_{TREF} is the threshold voltage for determining whether or not to supply toner. If V_T becomes greater than V_{TREF} (points "3" and "4" on the flow chart), the machine supplies additional toner.

- Toner Supply Motor On Time Calculation -

The toner motor on time is decided by the following factors (point "5" on the flow chart).

- ΔV_T (this is V_T - V_{TREF})
- Copy volume counter
- Paper size

The copy volume counter (C_{VOL}) is determined as follows:
0: 1-9 consecutive copies have been made with $\Delta V_T > 0$
1: 10-19 consecutive copies have been made with $\Delta V_T > 0$

If ΔV_T becomes negative at any time (i.e., there is enough toner), C_{VOL} decreases to 0.

The toner motor on times are shown below.

	Paper Length < 250 mm	**Paper Length 250 - 400 mm**	**Paper Length > 400 mm**
$0 < \Delta V_T <= 0.22$, $C_{VOL} = 0$	0.5	0.7	0.9
$0 < \Delta V_T <= 0.22$, $C_{VOL} = 1$	1.0	1.3	1.8
$\Delta V_T > 0.22$, $C_{VOL} = 0$ or 1	1.0	1.3	1.8

NOTE: The toner supply amount is 0.1 g for 0.5 s

4.5.6 Toner Supply in Abnormal sensor Conditions

There are two service codes for a TD sensor error. These SC conditions can be cleared by turning the main switch off and on again. After doing this, the machine automatically performs the TD sensor initial setting.

1. TD sensor error 1

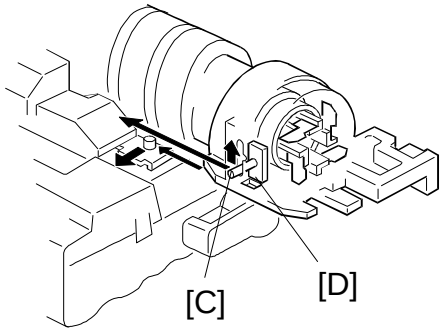
When the TD sensor output voltage (V_T) is less than 0.5 V, 20 seconds after the TD sensor initial setting has been performed, SC390 will be generated.

2. TD sensor error 2

When the TD sensor initial setting is finished, if the TD sensor output voltage (V_T) exceeds the specified range (2 ± 0.2 V), SC393 is generated.

4.5.7 Toner Supply

- Toner Bottle Replenishment Mechanism -



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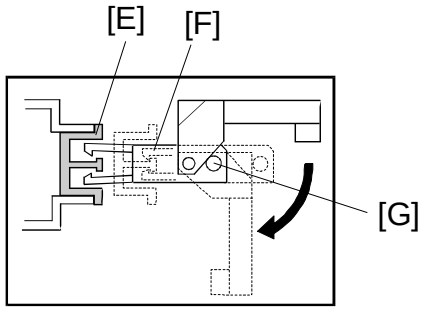
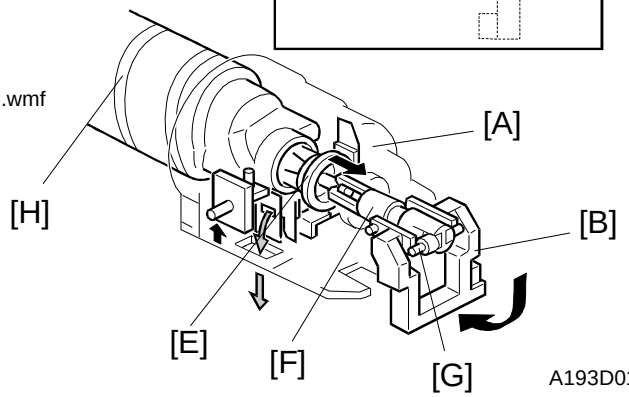




A193D019.wmf

When a toner bottle is placed on the bottle holder unit [A] and pushed back in completely and the toner bottle holder lever [B] is put back in the original position, the following happens automatically to allow toner to be supplied to the development unit.

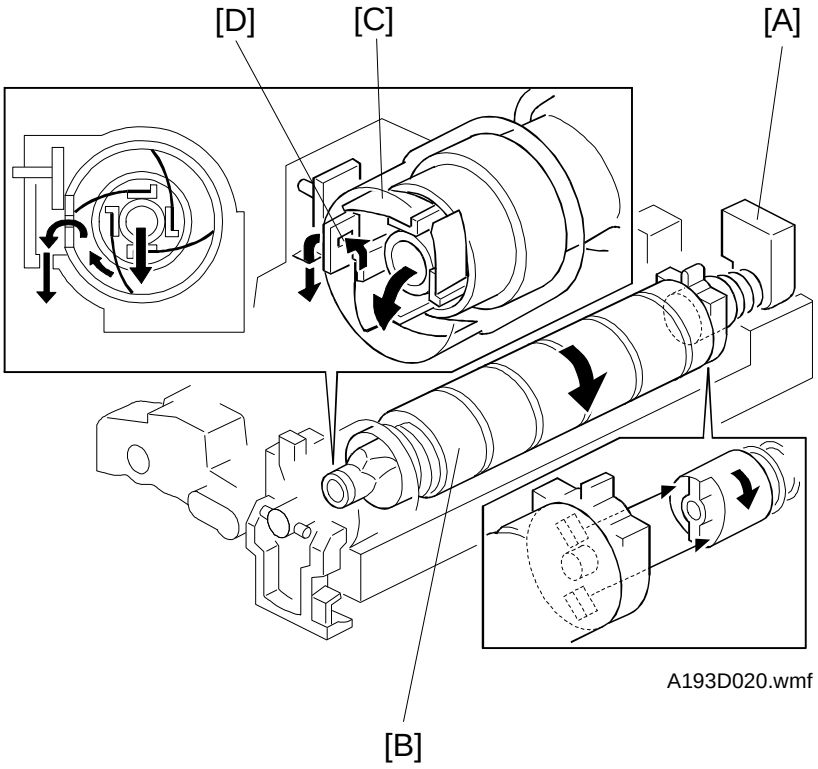
- The pin [C] on the toner shutter [D] is pulled out (opened) as a result of the shape of the developer cartridge.
- The cap [E] remaining on the toner bottle is pulled away and kept by the chuck [F] away from the movement of the roller [G], which rides along the curved rail behind the toner bottle holder lever.

The toner end detection system determines when to drive the toner bottle replenishment mechanism (see Toner End Detection). The toner supply mechanism transports toner from the bottle to the development unit. The toner bottle has a spiral groove [H] that helps move toner to the development unit.

When the bottle holder unit is pulled out to add new toner, the following happens automatically to prevent toner from scattering.

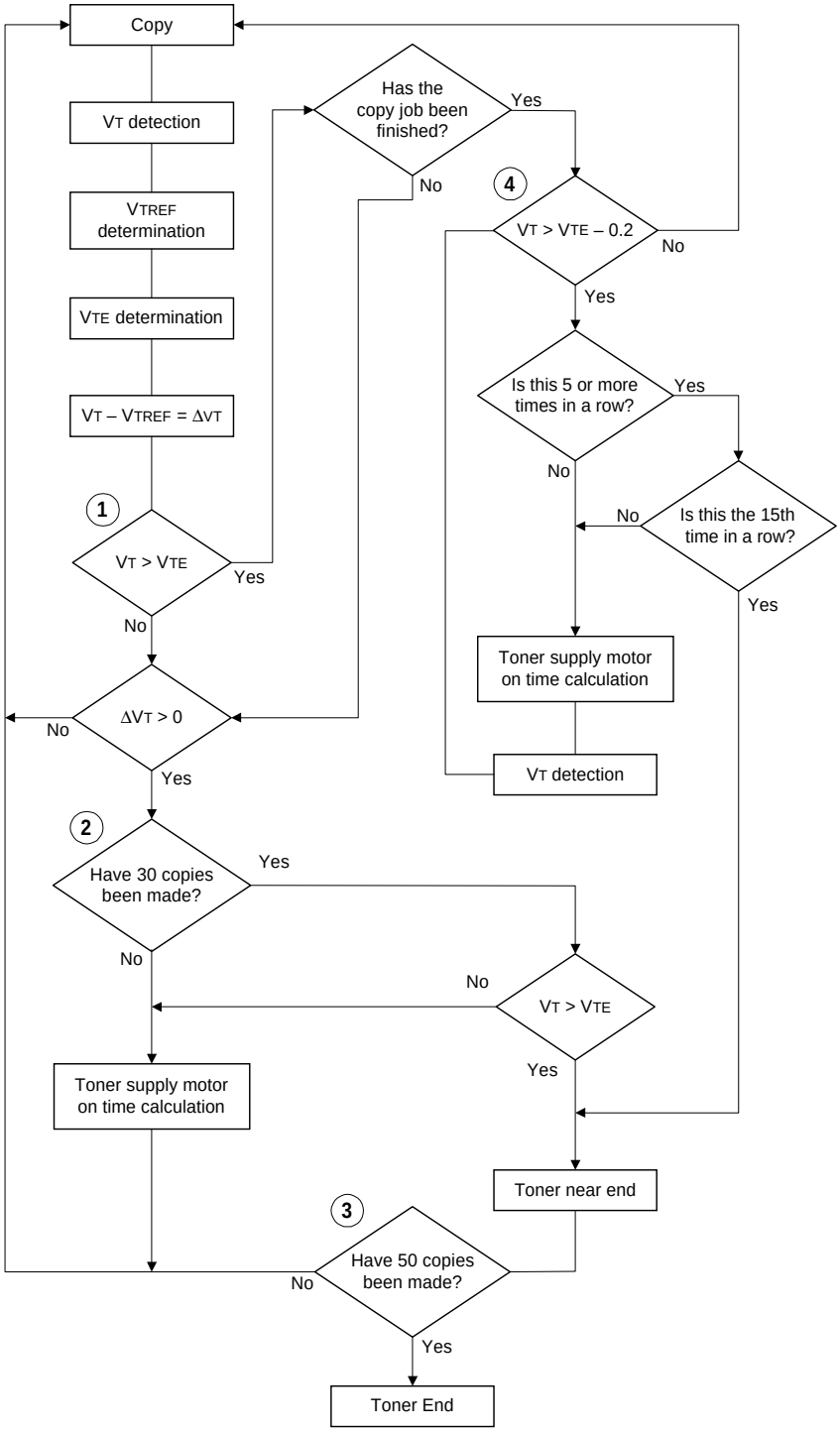
- The chuck releases the toner bottle cap into its proper position.
- The toner shutter shuts the opening as a result of pressure from a spring.

- Toner Supply Mechanism -



The toner supply motor [A] drives the toner bottle [B] and the mylar blades [C]. First, the toner falls down into the toner holder. The toner supply mylar blades transfer the toner to the slit [D], then the toner falls down into the development unit through the opening.

- Toner Near End/End Detection -



A193D541.wmf

There is no toner end sensor in this machine. Instead, toner end/near-end is detected using the TD sensor output data.

The machine checks for toner near end/end every copy. If toner near-end or toner end is detected during the copy job, it is also checked after finishing the copy job. To detect toner near end, the machine first decides the toner end reference voltage (V_{TE}) based on the TD sensor initial setting and the humudity sensor output. Then, the machine compares V_{TE} with the TD sensor output voltage (V_T): this is point 1 on the flow chart.

During a copy job:

If V_T is greater than V_{TREF} (this means the amount of toner in the development unit is low), the machine supplies toner (see Toner Supply).

If toner concentration is still low after 30 copies (point 2 on the flow chart), the machine checks for a toner near end condition (if V_T is greater than V_{TE}, there is a near end condition).

If toner concentration is still low 50 copies after toner near-end was determined (point 3 on the flow chart), the machine detects a toner end condition.

After a copy job:

When the machine detects that toner concentration is low, after the copy job is finished, the machine decreases V_{TE} by 0.2 V and compares the new V_{TE} with V_T ("4" on the flow chart). If the toner concentration is still low, the machine supplies toner. The machine then compares V_{TE} with V_T again, and supplies toner again if V_T is too low.

If the toner concentration is still too low after supplying toner 15 times ("5" on the flow chart), the machine detects a toner near-end condition.

If toner concentration is still low 50 copies after toner near-end was determined ("3" on the flow chart), the machine detects a toner end condition.

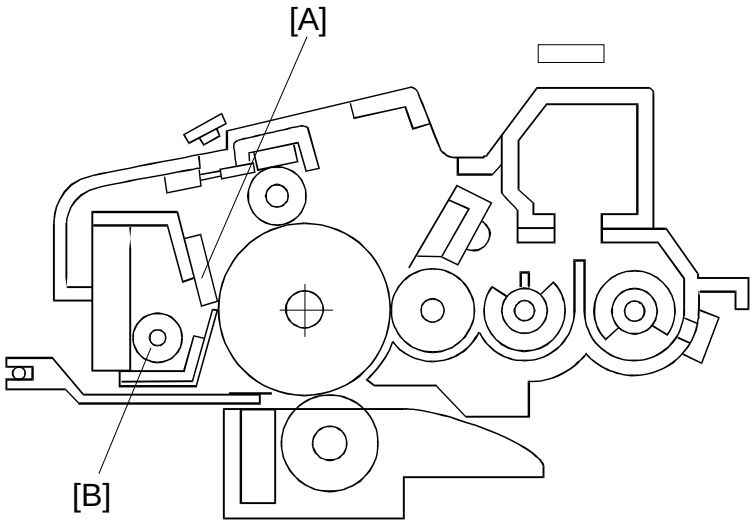
The number of copies between toner near-end and toner end can be changed with SP 2-213. The default is 50.

- Toner End Recovery -

If the front cover is opened and closed for more 10 seconds while a toner near-end/end condition exists and the toner bottle is replaced, the machine will attempt to recover for 3 minutes using the same procedure as for toner near-end/end detection after a copy job.

4.6 DRUM CLEANING AND TONER RECYCLING

4.6.1 Drum Cleaning



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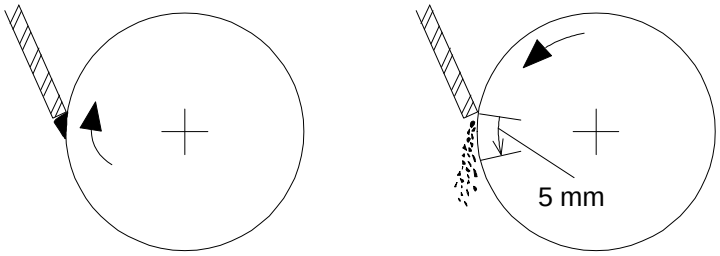

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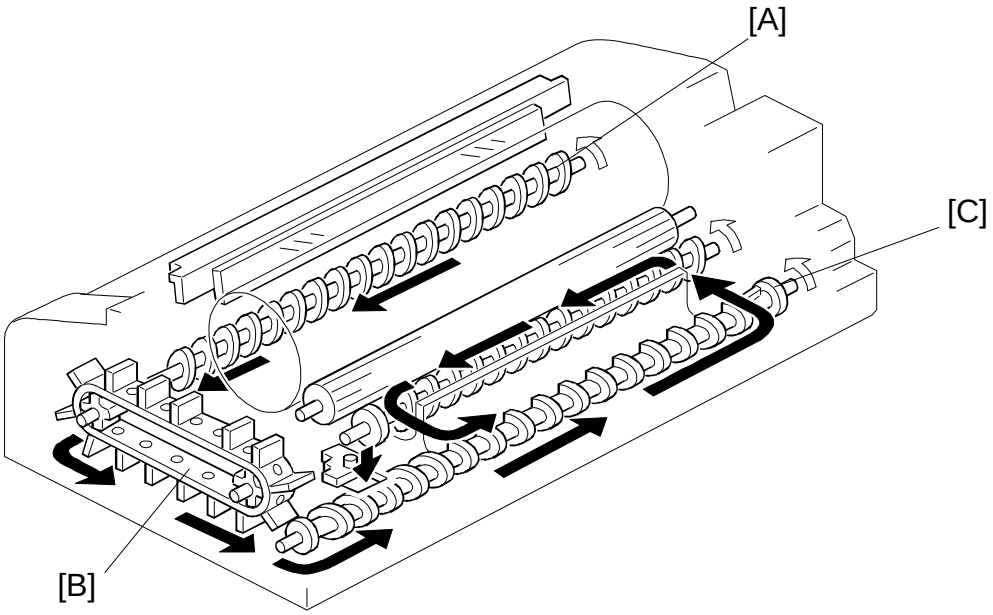
The cleaning blade [A] removes any toner remaining on the drum after the image is transferred to the paper. This model uses a counter blade system.

The toner remaining on the drum is scraped off by the cleaning blade, and it falls onto the toner collection coil [B].

To remove the toner and other particles that are accumulated at the edge of the cleaning blade, the drum turns in reverse for about 5 mm at the end of every copy job, as shown in the illustration. However, this is not done during transfer roller cleaning.

4.6.2 Toner Recycling



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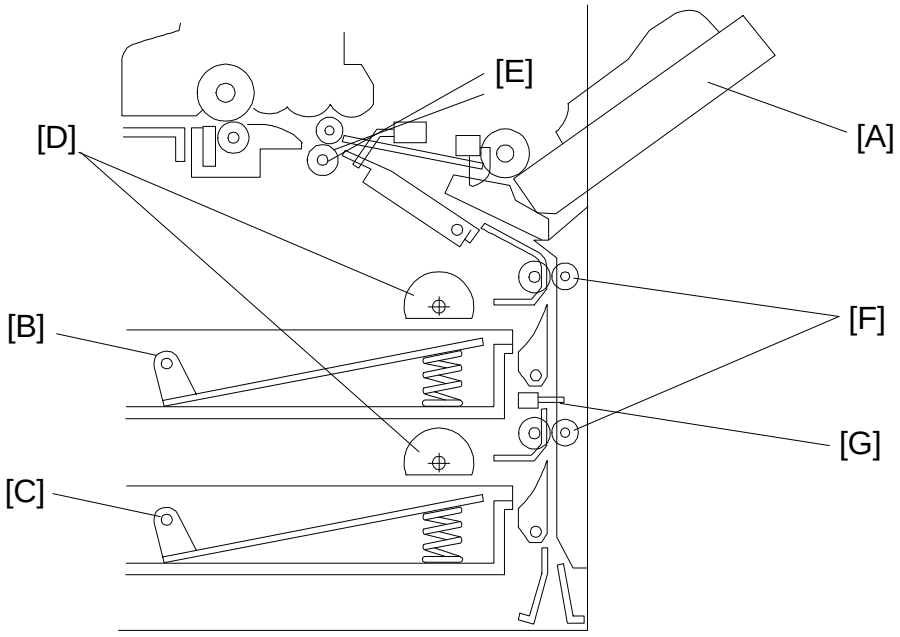
Toner which falls onto the toner collection coil [A] is transported to the recycled toner transport belt [B] at the front of the PCU. The recycled toner transport belt carries the toner to mixing auger 2 [C] in the development unit. This toner is mixed with new toner by mixing auger 2 and used again.

5. PAPER FEED

5.1 OVERVIEW



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There are two paper trays and a by-pass feed table [A].

The first [B] and second [C] paper trays each hold 250 sheets. The by-pass feed table can hold 1, 10, or 100 sheets of paper, depending on the paper size.

The semicircular feed rollers [D] drive the top sheet of paper from the tray to the registration rollers [E] through the relay rollers [F].

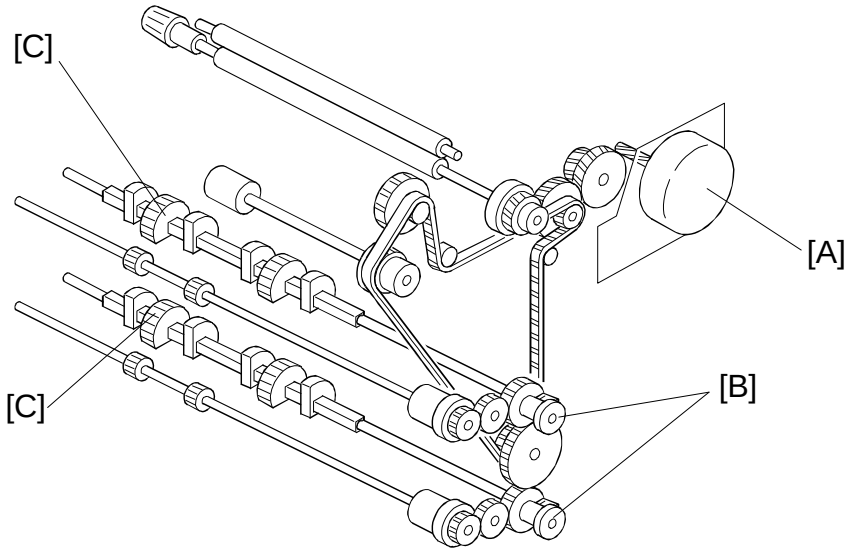
The tray has two corner separators (see [F] in the diagram in the "Paper Lift Mechanism" section), which allow only one sheet to feed at a time. The corner seperators, along with the tray's springs, also serve to set the height of the paper stack.

When the tray is closed after the paper is loaded, the paper size actuator located at the front right of the tray pushes the paper size sensor. This informs the cpu what paper size is loaded in the tray and that the tray is in place.

There is a relay sensor [G] located between the relay rollers. This sensor is used for paper jam detection.

5.2 PAPER TRAY

5.2.1 Paper Feed Drive Mechanism



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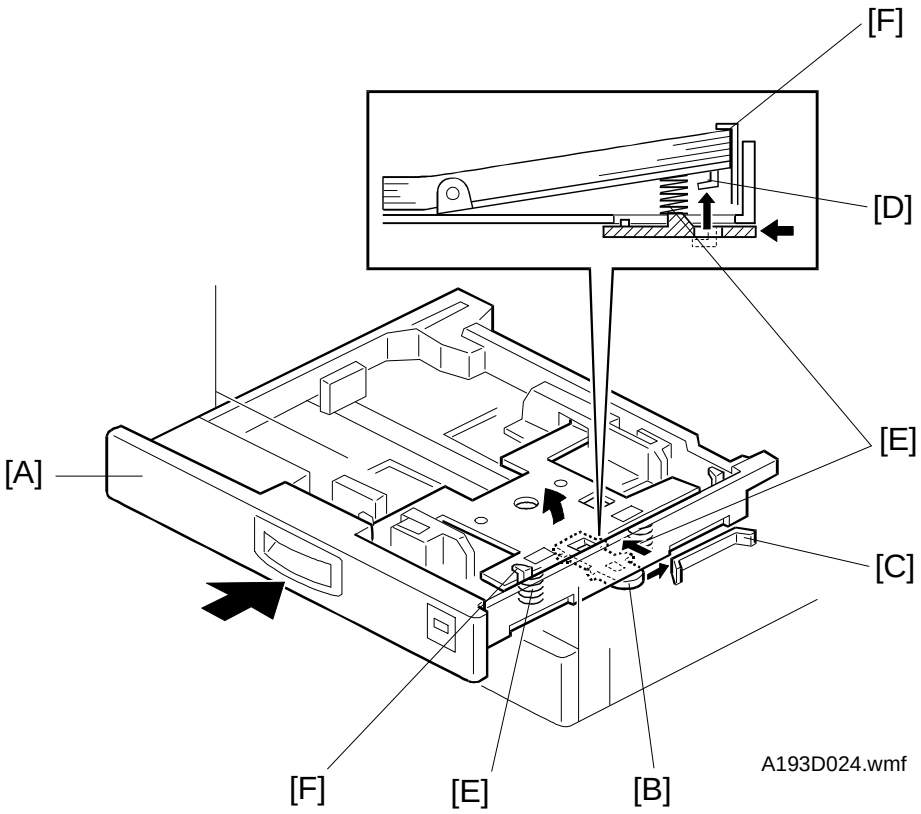
The main motor [A] drives the pick-up and feed mechanism of both the first and second paper trays. The paper feed clutches [B] transfer drive from this motor to the feed rollers [C].

The paper feed clutch turns on and the feed rollers start rotating to feed the paper. The paper feed clutch stays on for enough time to turn the paper feed rollers only once.

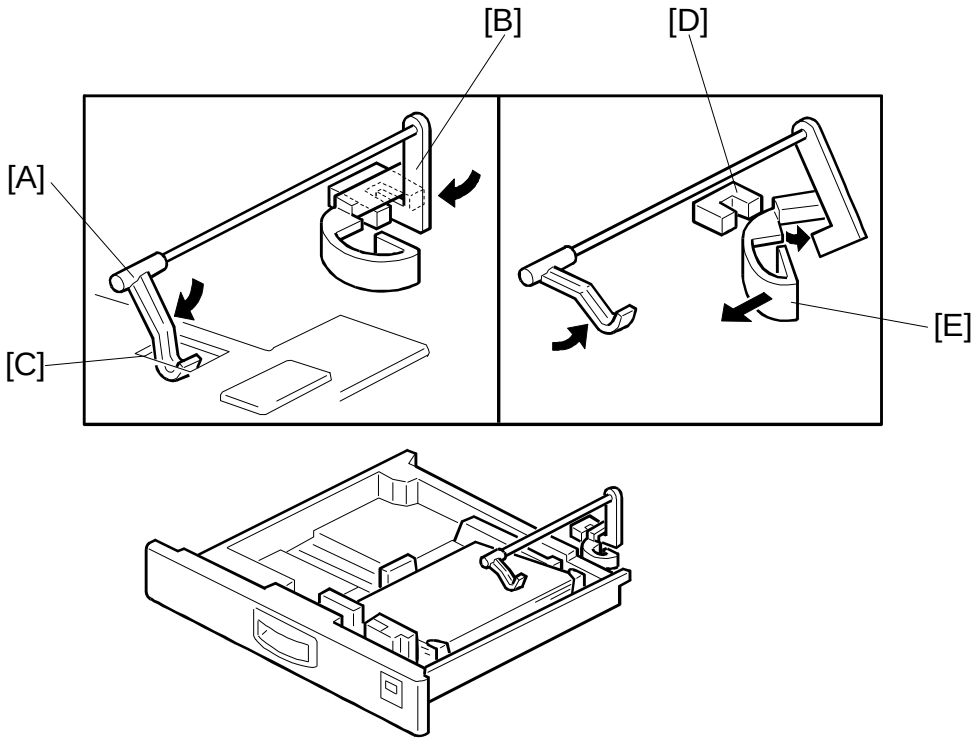
5.2.2 Paper Lift Mechanism



When the paper tray [A] is closed after paper is loaded, the release slider [B], which is mounted on the bottom part of the tray, is pushed by the projection [C] on the main frame and the release slider comes off the bottom plate hook [D].

Once the release slider comes off, the bottom plate is raised by the pressure springs [E] and the top sheet pushes up the corner separators [F]. This keeps the stack of paper at the correct height.

5.2.3 Paper End Detection



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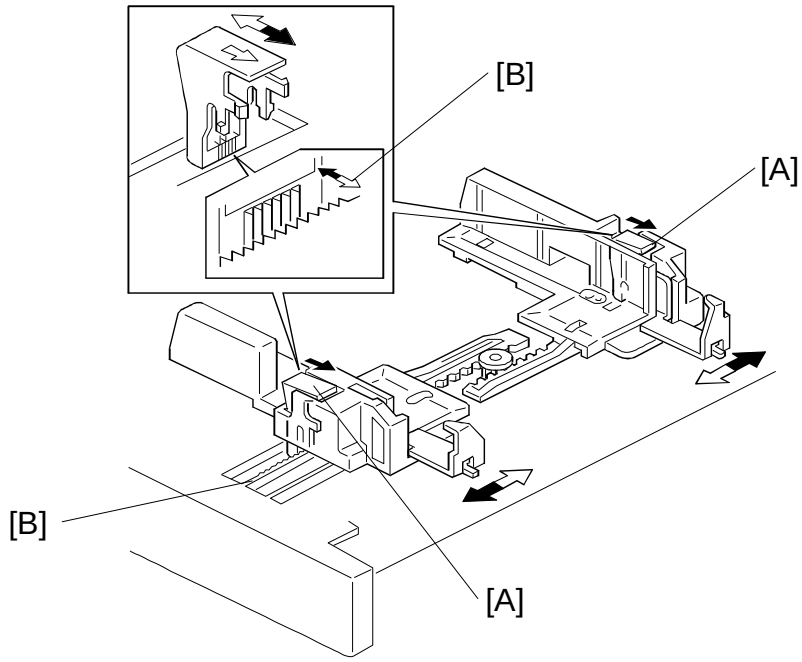
The paper end feeler [A] is on the same shaft as the paper end actuator [B]. When the paper tray runs out of paper, the paper end feeler drops into the cutout [C] in the tray bottom plate. The paper end actuator activates the paper end sensor [D].

The paper end actuator is in contact with the lever [E]. When the tray is drawn out, the lever turns as shown by the arrow in the figure. Then the lever pushes up the actuator. As a result, the feeler rotates upwards. This mechanism is necessary to prevent the feeler from getting damaged by the paper tray body.

5.2.4 Side Fence Double Stopper Mechanism



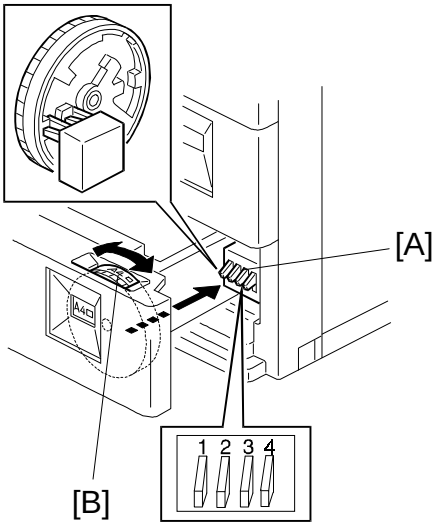
A193D026.wmf

There is a side fence stopper mechanism for both the front and rear side fences.

If the tray is closed with excessive force after loading paper, paper may come over the rear side fence, because the fence is deformed by the weight of the paper leaning against it. As a result, skewing or paper jams may occur. To prevent this, a side fence stopper mechanism has been added to the rear side fence also.

The release levers [A] each have a stopper which contains teeth like those on a gear. The guide rails [B] also have teeth. When the release lever is pushed, the gear teeth release each other and the side fences can be moved.

5.2.5 Paper Size Detection



SW / Size	1	2	3	4
A3, F(8 1/2"x13")	●	●	●	❍
A4 Lengthwise	●	❍	●	❍
A4 Sideways	●	●	❍	❍
A5 Sideways, 11"x17"	●	❍	❍	❍
B4, 8 1/2"x14"	❍	●	❍	❍
B5 Sideways, 8 1/2"x11"	❍	❍	❍	❍
B5 Lengthwise, 11"x8 1/2"	❍	❍	●	❍
* (Asterisk)	❍	❍	●	●

A193D025.wmf ●: ON (Not pushed) ❍: OFF (Pushed)

There are four paper size sensors (microswitches) [A] on the front right plate of the main frame. The sensors are actuated by a paper size actuator [B] behind the paper size indicator plate which is on the front right of the tray.

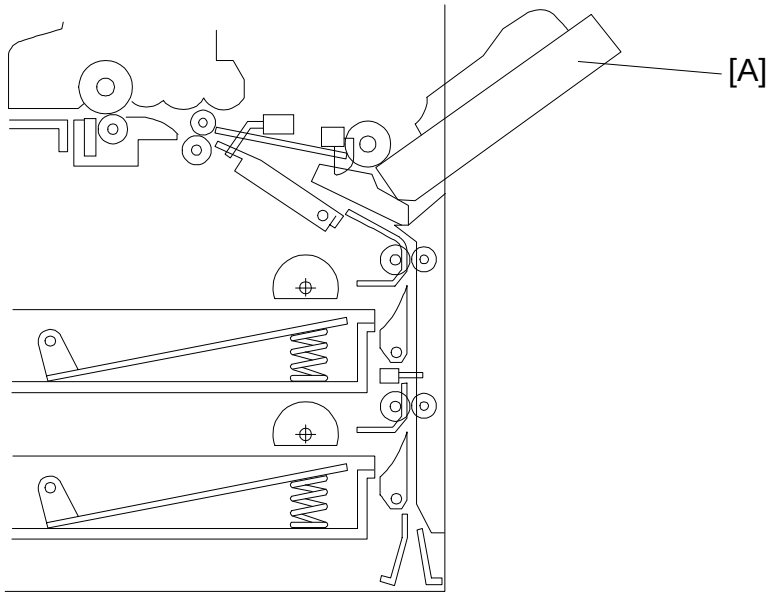
Each paper size has its own actuator, with a unique combination of notches. To determine which size tray has been installed, the cpu reads which micro switches have been switched off by the actuator.

The cpu disables paper feed from a tray if the paper size cannot be detected. If the paper size actuator is broken, or if there is no tray installed, the Add Paper indicator will light.

When the paper size actuator is at the "*" mark, the paper tray can be set up to accommodate one of a wider range of paper sizes by using a User Tool. If the paper size for this position is changed without changing the User Tool setting, a paper jam will result.

5.3 BY-PASS FEED

5.3.1 Overview



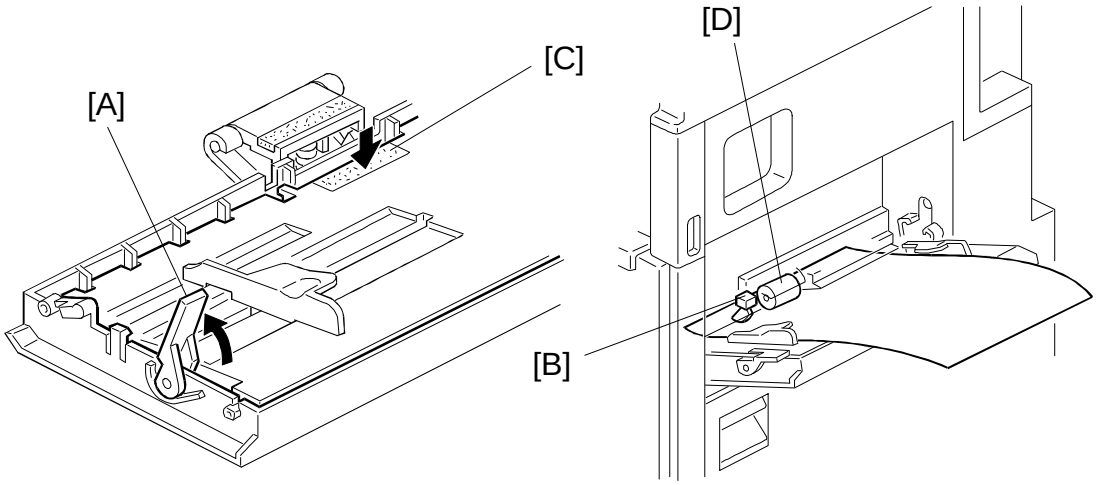
A193D022-2.wmf

The by-pass feed table [A] can hold 100 sheets of paper.

This machine does not have a by-pass feed cover sensor. The by-pass feed indicator is always displayed on the LCD. The Add Paper indicator will light when the user selects by-pass feed while the by-pass feed table is closed or if there is no paper on the by-pass feed table.

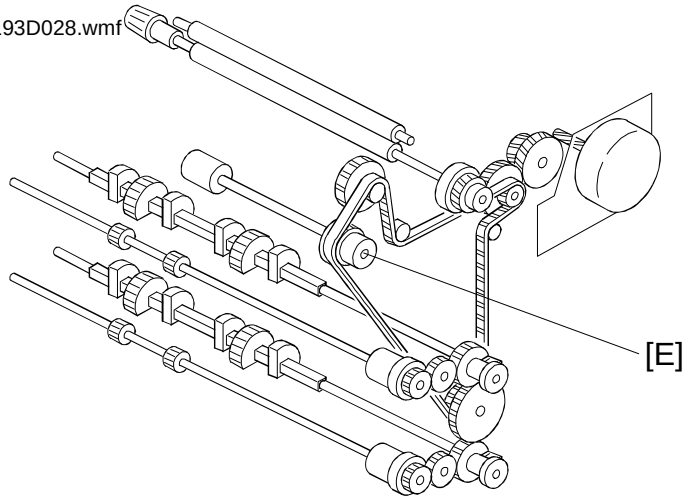
After the Start key is pressed, the cpu energizes the by-pass feed clutch and the by-pass feed roller starts to feed paper to the registration roller.

5.3.2 Paper Feed Mechanism and Paper End Detection



A193D029.wmf

A193D028.wmf



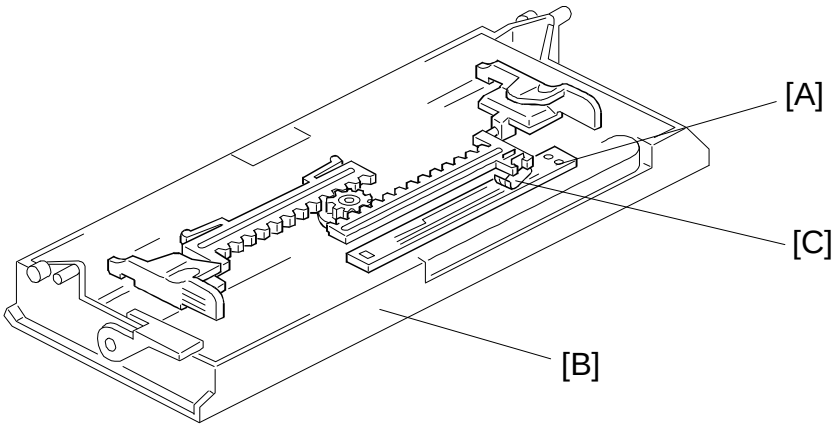
A193D033-2.wmf

This machine uses a feed roller and friction pad mechanism, with drive from the main motor transmitted when the by-pass feed clutch [E] turns on. The friction pad prevents all but the top sheet from feeding. Therefore, during paper feed, the top sheet of paper is separated from the stack and fed to the registration rollers.

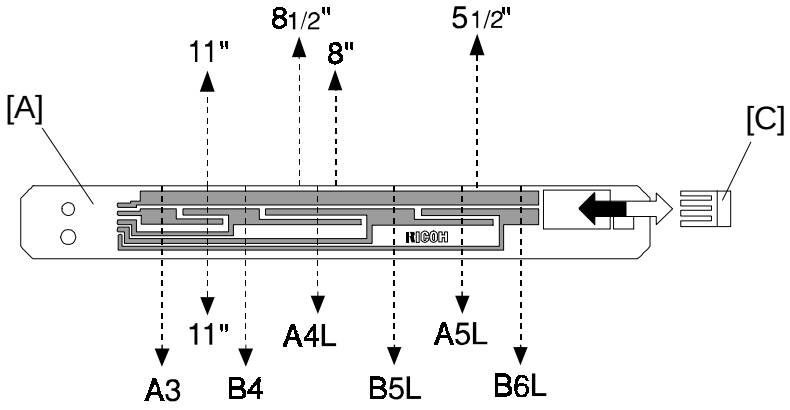
Before placing the paper on the by-pass feed table, the user must lower the by-pass feed table by using the lever [A]. This is to ensure that the paper is placed between the friction pad [C] and the feed roller [D]. Then, before starting to copy, it must be put back up to move the paper stack into contact with the feed roller.

When there is no paper on the by-pass feed table, the paper end feeler [B] drops into the cutout in the by-pass feed table and the by-pass feed paper end sensor is activated.

5.3.3 By-pass Feed Paper Width Detection



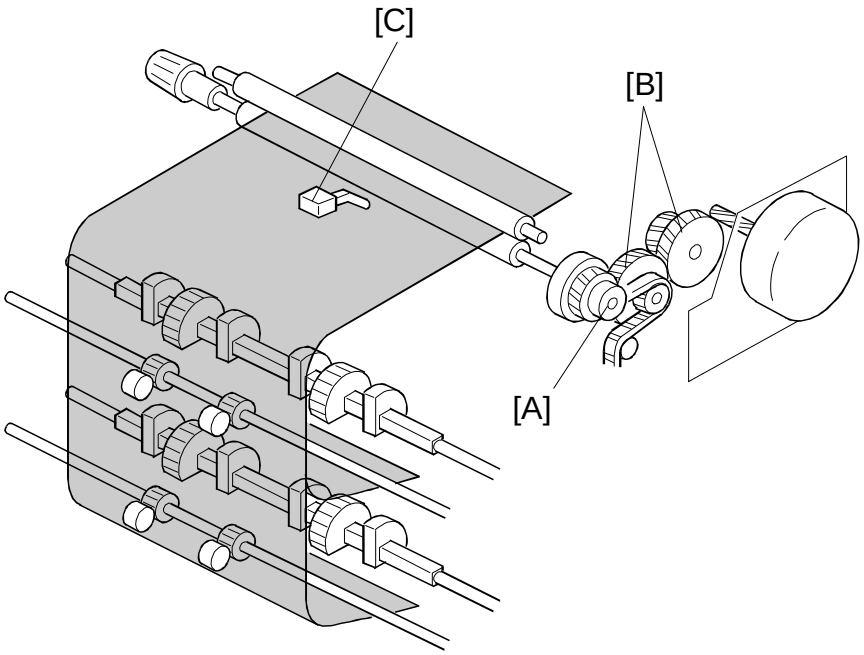
A193D030.wmf



A193D524.wmf

The paper width switch [A] is a slide switch located inside the by-pass feed table [B]. It measures the paper width manually. The rear side fence is connected to the terminal plate [C]. When the side fences are moved to match the paper width, the terminal plate slides along the wiring patterns on the detection board. The patterns for each paper width on the paper width detection board are unique. Therefore, the machine determines which paper width has been placed in the by-pass feed table by the signal output from the board. However, the machine will not determine the paper length. For example, A4 paper set sideways will be determined to be A3 paper.

5.4 PAPER REGISTRATION



A193D032.wmf

Main motor rotation is transmitted to the registration clutch [A] (located on the lower registration roller shaft) through the relay gears [B].

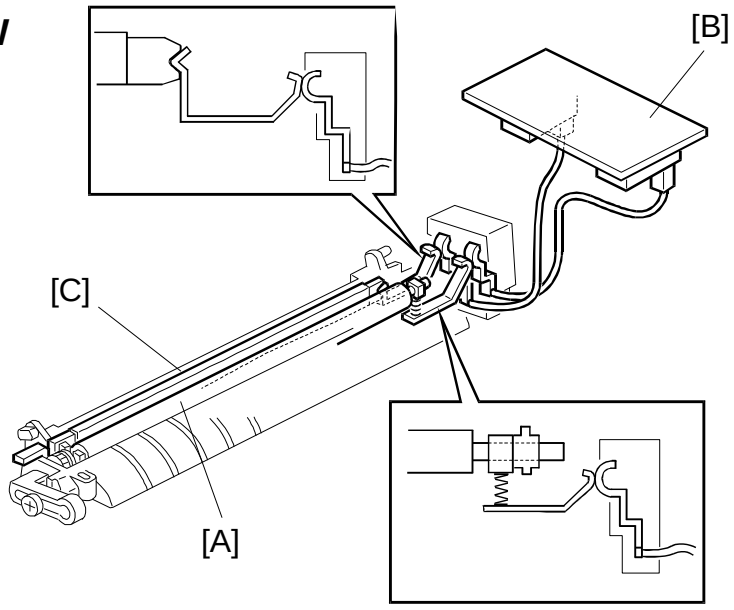
The registration sensor [C] is positioned just before the registration rollers.

When the paper leading edge activates the registration sensor, the registration clutch turns off and the registration rollers stop turning. However, the relay clutch stays on for a bit longer. This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew. The registration clutch energizes and the relay clutch re-energizes at the proper time to align the paper with the image on the drum. The registration and relay rollers feed the paper to the image transfer section.

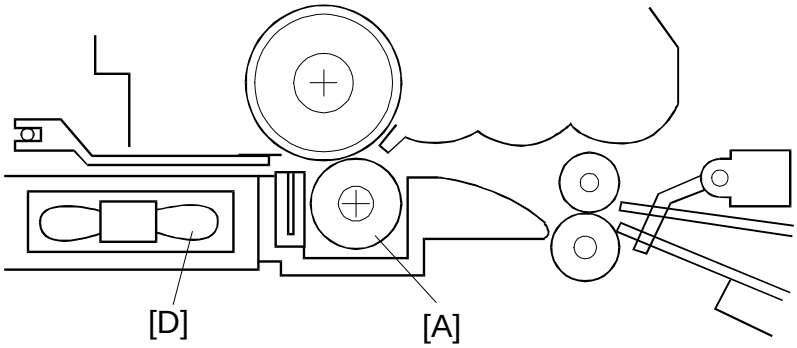
The registration sensor is also used for paper misfeed detection.

6. IMAGE TRANSFER AND PAPER SEPARATION

6.1 OVERVIEW



A193D538-2.wmf



A193D021.wmf

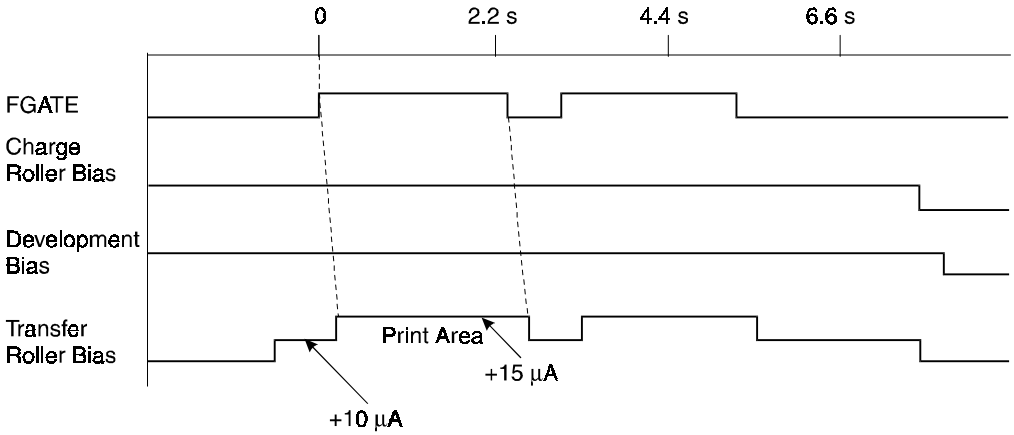
Instead of using a transfer wire and a transfer belt, this machine uses a transfer roller [A], which touches the drum surface.

The high voltage supply board [B] supplies a positive current (approximately +15 μA) to the transfer roller. The roller has a high electrical resistance, so it can hold a high positive electrical potential to attract toner from the drum onto the paper.

There is a discharge brush [C] after the transfer roller. The curvature of the drum and the discharge brush helps the paper to drop away from the drum.

The transport fan [D] under the transport guide plate helps to transport the paper from the transfer area to the fusing unit.

6.2 IMAGE TRANSFER AND PAPER SEPARATION MECHANISM



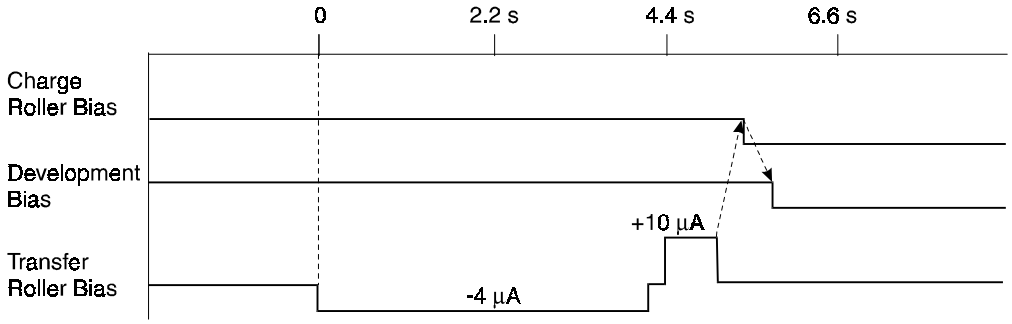
FGATE: Laser main scan writing start signal

A193D530.wmf

The transfer roller starts rotating at the same time as the main motor starts to rotate.

1. When the CPU receives the image writing start signal (FGATE signal), the CPU instructs the power pack to supply +10 µA (low transfer bias) to the roller. This prevents any positively charged toner on the drum surface from transferring to the transfer roller.
2. At a certain time after the low transfer bias has been supplied to the roller, +15 µA (high transfer bias) is applied to the roller to transfer the toner to the paper.
3. After the trailing edge of the paper has passed through the roller, the transfer bias turns off. In the multiple copy mode, the transfer bias shifts again to the low transfer bias.

6.3 ROLLER CLEANING



A193D531.wmf

If the paper size is smaller than the printed image, or if a paper jam occurs during printing, toner may be transferred to the roller surface. To prevent this toner from transferring to the back side of copies, the transfer roller has to be cleaned before the next printing run.

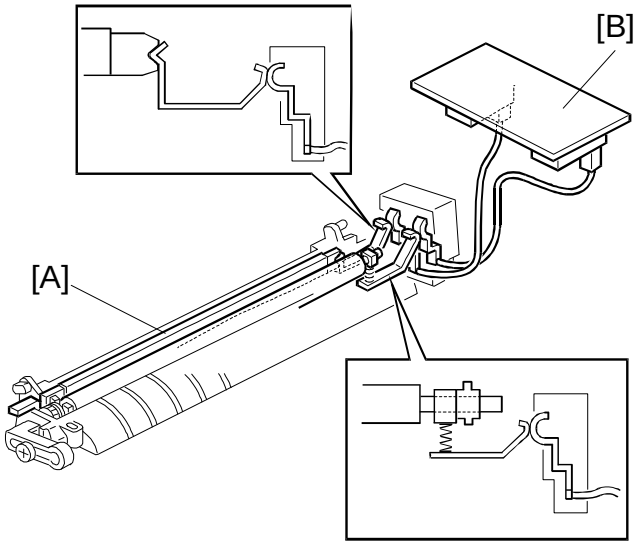
During transfer roller cleaning, the power pack supplies a negative cleaning bias (- 4 µA) to the transfer roller. So, any negatively charged toner on the transfer roller is then transferred back to the drum. Then a positive cleaning bias of +10 µA is applied to transfer back to the drum any toner which was positively charged by the transfer roller.

The machine goes through the cleaning mode in the following conditions:

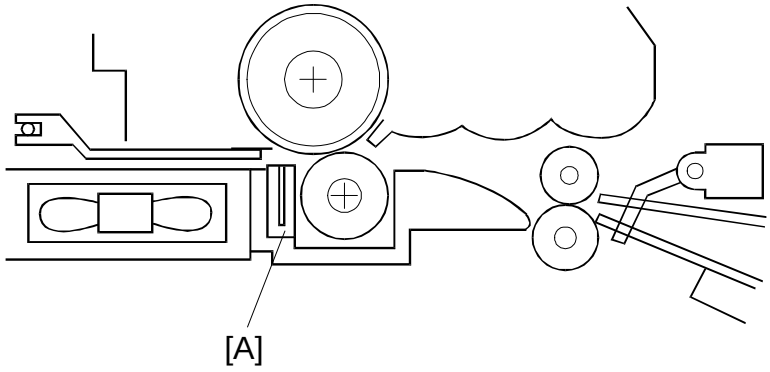
- After a copy job has been finished.
- At the same time as power on.
- After a printer jam has been cleared.

Also, transfer roller cleaning can be done forcibly by SP2-910.

6.4 PAPER SEPARATION AND TRANSPORTATION



A193D538.wmf



A193D021-2

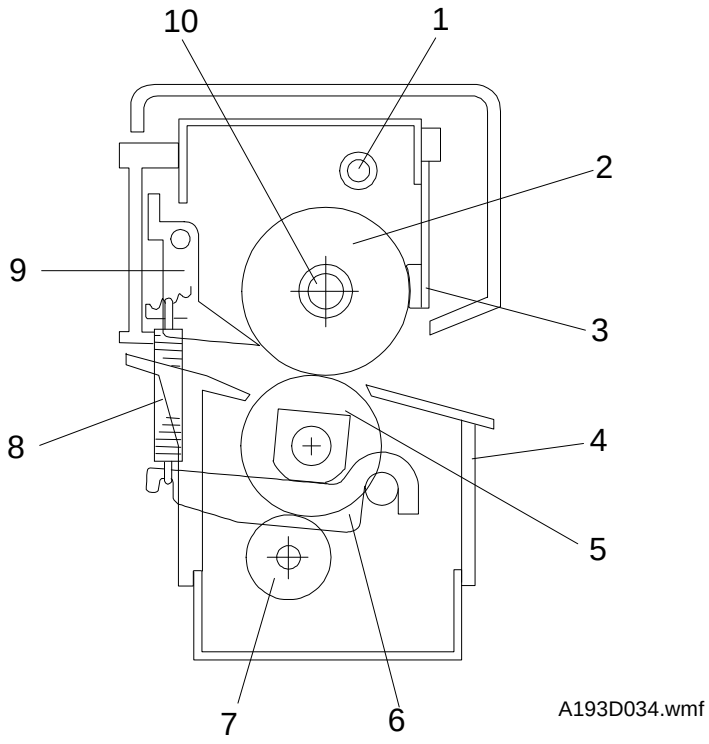
The discharge brush [A] and the curvature of the drum help the paper to drop away from the drum. The high voltage supply board [B] applies a constant dc voltage, +2 kV (when feeding from a paper tray), or +2.5 kV (from the duplex tray) to the discharge brush.

The transport fan helps to transport the paper from the transfer area to the fusing unit. The transport fan turns on at the same time as the main motor. Also, the transport fan turns off at the same time as the main motor.

The discharge brush voltage can be adjusted using SP 2-901 (there are separate settings for the front and rear side, and for the leading edge and other areas of the paper).

7. IMAGE FUSING

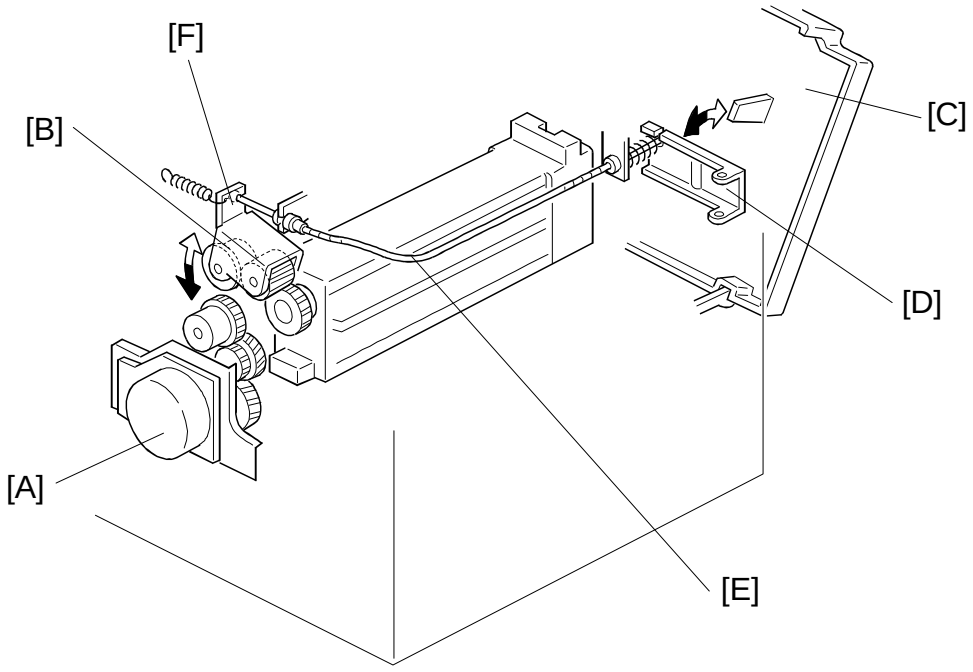
7.1 OVERVIEW



The fusing unit consists of the following parts.

1. Fusing thermofuse
2. Hot roller
3. Fusing thermistor
4. Lower entrance guide
5. Pressure roller
6. Pressure lever
7. Cleaning roller
8. Pressure spring
9. Hot roller strippers
10. Fusing lamp

7.2 FUSING DRIVE AND RELEASE MECHANISM



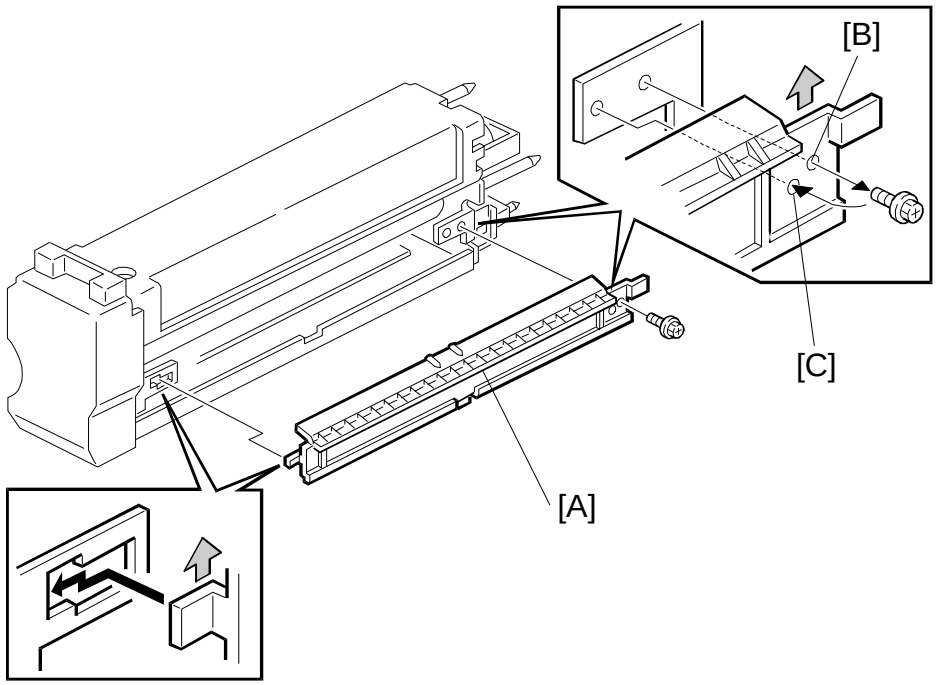
A193D036.wmf

The main motor [A] drives the fusing unit through a train of gears.

The fusing unit drive release mechanism automatically disengages the fusing unit drive gear [B] when the front cover [C] is opened. This allows the fusing unit drive gear to rotate freely so that misfed paper can be easily removed.

When the front cover is opened, the actuator plate [D] pulls release wire [E]. The wire pulls the fusing unit gear bracket [F] and the fusing unit drive is disengaged.

7.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM



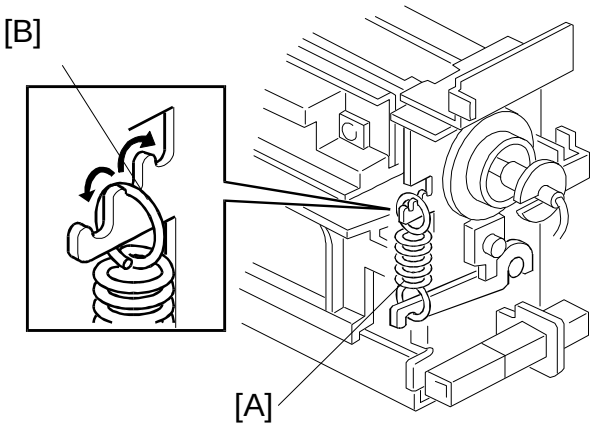
A193D539.wmf

The entrance guide [A] for this machine has two holes on the rear side of the entrance guide to adjust for thick or thin paper. Normally, the upper screw hole [B] is used.

For thin paper, move the entrance guide up by securing it with screw hole [C]. This slightly lengthens the paper path, which prevents the paper from creasing in the fusing unit.

For thick paper, move the entrance guide down (use the lower screw hole). This is because the lower setting allows more direct access to the gap between the hot and pressure rollers. This prevents thick paper from buckling against the hot roller, which can cause blurring at the leading edge of the copy. Also, thick paper does not bend as easily, and is therefore less prone to creasing.

7.4 PRESSURE ROLLER

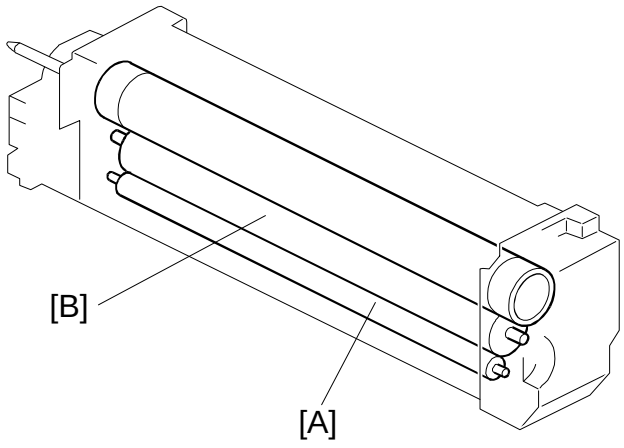


A193D035.wmf

The pressure roller is made of silicone rubber with teflon tube coating. The pressure spring [A] constantly applies pressure between the hot roller and the pressure roller.

The pressure roller can be changed by adjusting the position of the pressure springs. The middle position [B] is the normal setting. The upper position increases the pressure and this prevents insufficient fusing.

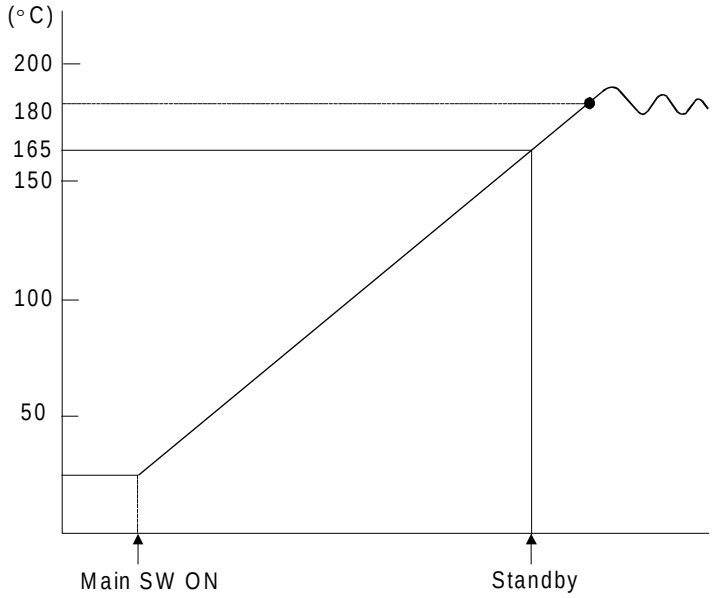
7.5 CLEANING MECHANISM



A193D537.wmf

The cleaning roller [A] is always in contact with the pressure roller [B]. It collects toner and paper dust adhering to the surface of the pressure roller. This is because the cleaning roller is made of metal and collects adhering matter more easily than the pressure roller (which has a teflon coating).

7.6 FUSING TEMPERATURE CONTROL



A193D525.wmf

When the main switch turns on, the CPU checks the ac frequency for 500 ms. Then the CPU turns on the fusing lamp. When the thermistor detects the stand-by temperature (165 °C), the machine can start to print. When the thermistor detects the operating fusing temperature (180 °C), the CPU maintains this temperature using phase control.

Phase control is the only type of fusing control in this machine.

7.7 OVERHEAT PROTECTION

If the hot roller temperature becomes greater than 230°C, the CPU cuts off the power to the fusing lamp. At this time, SC543 will be generated.

Even if the thermistor overheat protection fails, there is a thermofuse in series with the common ground line of the fusing lamp. If the temperature of the thermofuse reaches 169°C, the thermofuse opens, removing power from the fusing lamp. At this time, the copier stops operating.

8. ENERGY SAVER MODES

8.1 OVERVIEW

When the machine is not used, the energy saver function reduces power consumption by decreasing the fusing temperature.
This machine has three types of energy saver mode as shown below.

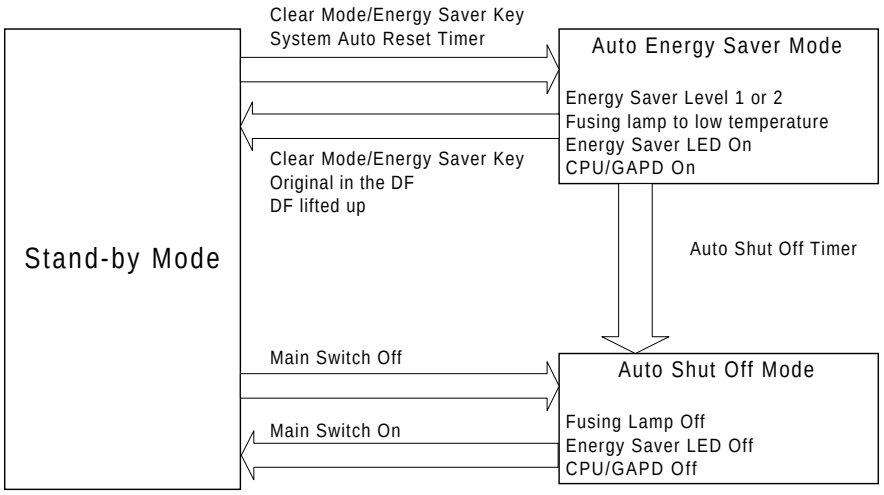
1. Auto Energy Saver Mode
2. Auto Shut Off Mode
3. Night Mode

These modes are controlled by the following UP modes.

- System Auto Reset Timer
- Auto Shut Off Timer
- Auto Energy Saver Mode Enable/Disable
- Auto Shut Off Mode Enable/Disable (SP mode only)

The way that the machine operates depends on the combination of installed equipment (copier only, copier/printer, copier/fax, copier/fax/printer)

8.2 COPIER ONLY



A193D547.wmf

Entering energy saver mode

The machine enters energy saver level 1 or 2 when one of the following is done.

- The system auto reset timer runs out.
- The Clear Mode/Energy Saver key is held down for over 1 s

What happens in energy saver modes 1 and 2

When the machine enters energy saver level 1 or 2, the fusing lamp drops to a certain temperature, depending on the energy saver level selected (UP mode).

The fusing temperature for energy saver level 1 is 15°C below the fusing lamp operating temperature, which is set by SP1-105-1 (default: 180 - 15 = 165°C). The fusing temperature for energy saver level 2 is the value set by SP1-105-2 (default: 140°C for 115V machines, room temperature for 230V machines).

When the auto shut off timer runs out

The auto shut off timer starts when the machine enters standby mode.

When this timer runs out, the machine enters auto shut off mode and the main switch turns off automatically. The fusing lamp and all dc supplies except +5VE turn off.

+5VE is the 5 volt supply for energy saver mode. It saves energy by supplying +5V power only for the components needed in energy saver mode.

Note that turning the main switch off is the same as entering auto shut off mode.

Returning to standby mode

- From energy saver level 1 or 2 -

If one of the following is done, the machine returns to standby mode:

- Pressing the Clear Mode/Energy Saver key
- Placing an original in the ADF
- Lifting up the ADF

The recovery time from energy saver level 1 is about 3 s.
The recovery time from energy saver level 2 is about 10 s (115 V machines) or about 35 s (230 V machines).

- From auto shut off mode -

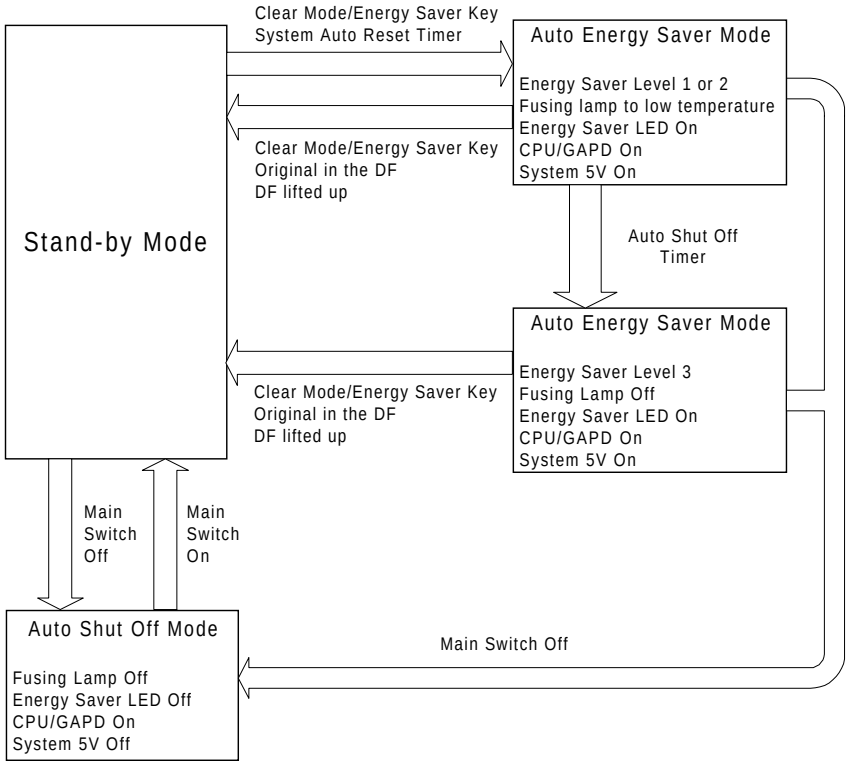
The machine returns to the ready condition when the main switch is turned on.

The recovery time is less than 30 s for 115V machines, and less than 35 s for 230V machines.

Power Consumption

Mode	Main Switch	Energy Saver LED	Fusing Lamp	System +5V	Note
Energy Saver Level 1	On	On	165°C	On	The machine returns to standby mode if the DF is lifted or an original is placed in the ADF.
Energy Saver Level 2	On	On	140°C (115V) Room T (230V)	On	
Auto Shut Off Mode	Off	Off	Off	Off	The machine returns to standby mode only if the main switch is turned on.

8.3 COPIER/PRINTER



A193D548.wmf

Entering energy saver mode

The machine enters energy saver level 1 or 2 in the same way as the copier only configuration.

What happens in energy saver modes 1 and 2

The behaviour of the machine in energy saver levels 1 and 2 is the same as in the copier only configuration (fusing lamp at low temperature).

However, when the auto shut off timer runs out, the machine enters energy saver mode level 3 instead of auto shut off mode.

What happens in energy saver level 3

When the machine enters energy saver level 3, the fusing lamp turns off completely. However, the system 5 volt supply stays on. The recovery time from this level is the same as for recovery from auto shut off mode. The machine will print incoming print jobs from a computer.

From energy saver level 3, the machine returns to standby mode in the same way as from energy saver levels 1 and 2.

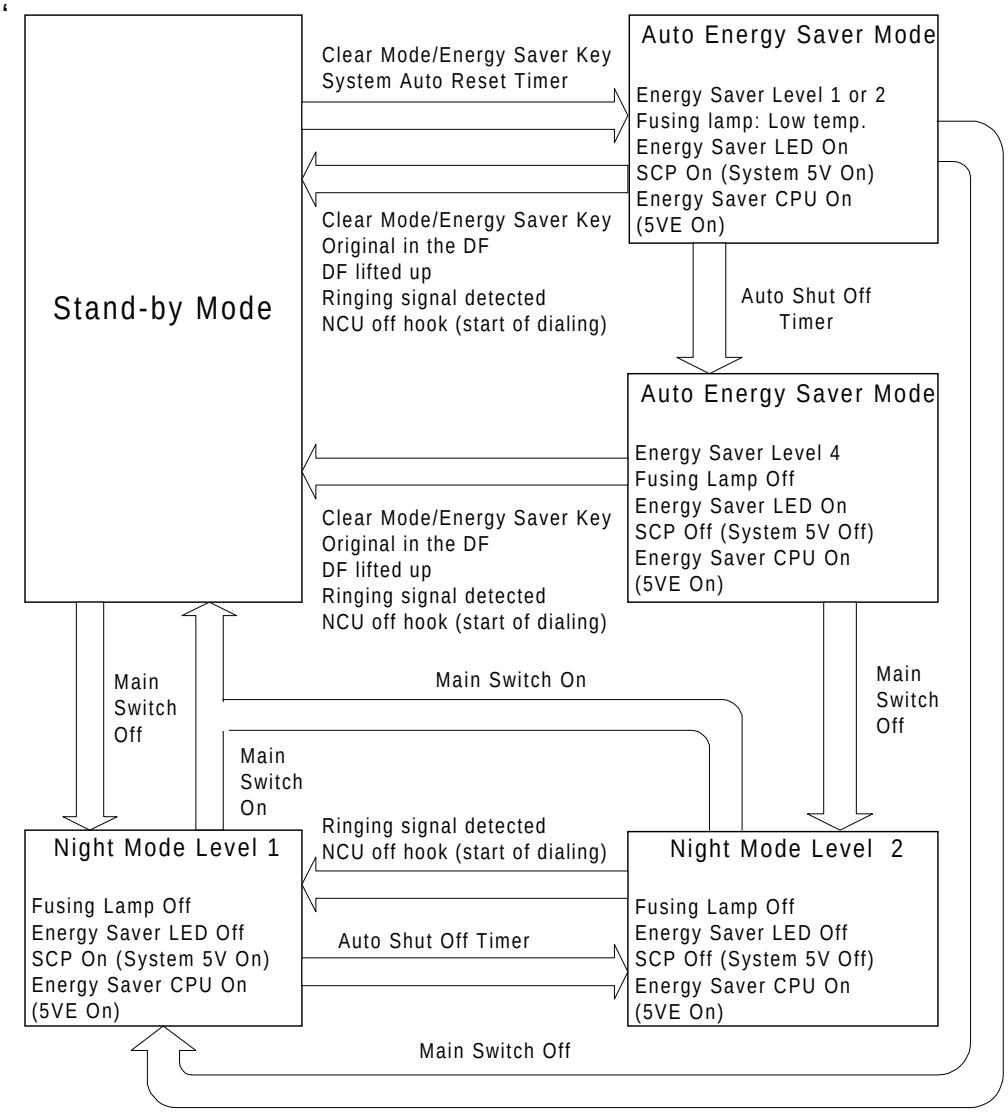
Entering auto shut off mode

The machine only enters auto shut off mode if the main switch is turned off. In this mode, the fusing lamp turns off and the machine will not print anything coming in from a computer.

Power Consumption

Mode	Main Switch	Energy Saver LED	Fusing Lamp	System +5V	Note
Energy Saver Level 1	On	On	165°C	On	The machine returns to standby mode if the DF is lifted or an original is placed in the ADF. Data from a PC is printed.
Energy Saver Level 2	On	On	140°C (115V) Room T (230V)	On	
Energy Saver Level 3	On	On	Off	On	
Auto Shut Off Mode	Off	Off	Off	Off	The machine returns to standby mode only if the main switch is turned on. Data from a PC is not printed.

8.4 COPIER/FAX, COPIER/PRINTER/FAX



A193D549.wmf

Energy saver mode is more complex in this configuration. This is because there are two night modes, instead of the auto shut off mode. Night mode level 2 is similar to auto shut off mode. Night mode level 1 keeps the machine in a slightly higher state of readiness (the main cpu is active and the system 5 volt supply is on, but the fusing lamp is still off).

Entering energy saver mode

The machine enters energy saver level 1 or 2 in the same way as the copier only and copier/printer configurations.

What happens in energy saver modes 1 and 2

The behaviour in these levels is the same also (fusing lamp at low temperature). However, there are two extra cases for leaving energy saver mode:

- Ringing signal detected
- NCU off-hook (the machine starts to dial a fax number)

If the auto shut off timer runs out while the main switch is still on, the machine enters energy saver level 4.

What happens in energy saver mode 4

In this mode, the fusing lamp switches off. Also, the system +5V supply switches off. Only the +5VE supply stays on, so that the machine can monitor the ADF, the telephone line, and the operation panel.

The machine recovers to standby mode in the same conditions as for level 1 or 2. For example, incoming faxes and printer jobs will be printed. The recovery time from this level is the same as for recovery from auto shut off mode.

Entering night mode

If the main switch is turned off while the machine is in standby or energy saver mode 1 or 2, the machine enters night mode 1.

If the main switch is turned off while the machine is energy saver mode 4, the machine enters night mode 2.

- Night mode 1 -

The fusing lamp turns off. However, the system +5V is still supplied to all components. When the machine detects a ringing signal, the machine automatically prints the incoming message.

From night mode level 1, the machine goes to night mode level 2 when the auto shut off timer runs out.

- Night mode 2 -

The system +5V supply also turns off. However, +5VE (+5V for the energy saver) is still activated. If the machine detects a ringing signal or off-hook signal, the machine goes back to night mode level 1. At this time, the system +5V supply is activated. Then the machine receives the incoming message and prints it.

The machine leaves night mode and returns to standby mode if the main switch is turned on.

Power Consumption

Mode	Main Switch	Energy Saver LED	Fusing Lamp	System +5V	Note
Energy Saver Level 1	On	On	165°C	On	The machine returns to standby mode if the DF is lifted or an original is placed in the ADF. Incoming faxes and data from a PC are printed.
Energy Saver Level 2	On	On	140°C (115V) Room T (230V)	On	
Energy Saver Level 4	On	On	Off	On	
Night Mode Level 1	Off	Off	Off	On	Incoming faxes are printed, and faxes can be sent. However, PC data is not printed. For copying, the machine returns to standby mode only if the main switch is turned on.
Night Mode Level 2	Off	Off	Off	Off	If an incoming call (ringing signal) is detected, or if the user tries to send a fax, the machine goes into Night Mode Level 1. PC data is not printed. For copying, the machine returns to standby mode only if the main switch is turned on.

8.5 ENERGY SAVER CONTROL

The block diagram on the next page shows the relationship between the power supply signals and the command signals for energy saver mode.

There are two CPUs for energy saver mode. One is the CPU/GAPD (Gate Array Power Drive) on the BICU board and the other is the Energy Saver CPU on the FCU board.

The +5VE supply is for energy saver mode, and it is always supplied to the machine. The +5V supply is shut down in some energy saver modes.

Copier configuration

When either the Clear Modes/Energy Saver Mode key is pressed or the system auto reset timer runs out, the GAPD turns on the Energy Saver LED and requests the main CPU to reduce the fusing temperature.

When the auto shut off timer runs out, the GAPD turns off the main switch using the SW_TRG signal. Then IC 11 on the BICU board sends a signal to the PSU, and the PSU shuts down the +5V, +12V, -12V, and +24V supplies and cuts the ac power for the fusing lamp.

Copier/printer configuration

The GAPD controls the energy saver function, as in the copier configuration. When the auto shut off timer runs out, the GAPD keeps the Energy Saver LED on but requests the main CPU to cut the fusing lamp power.

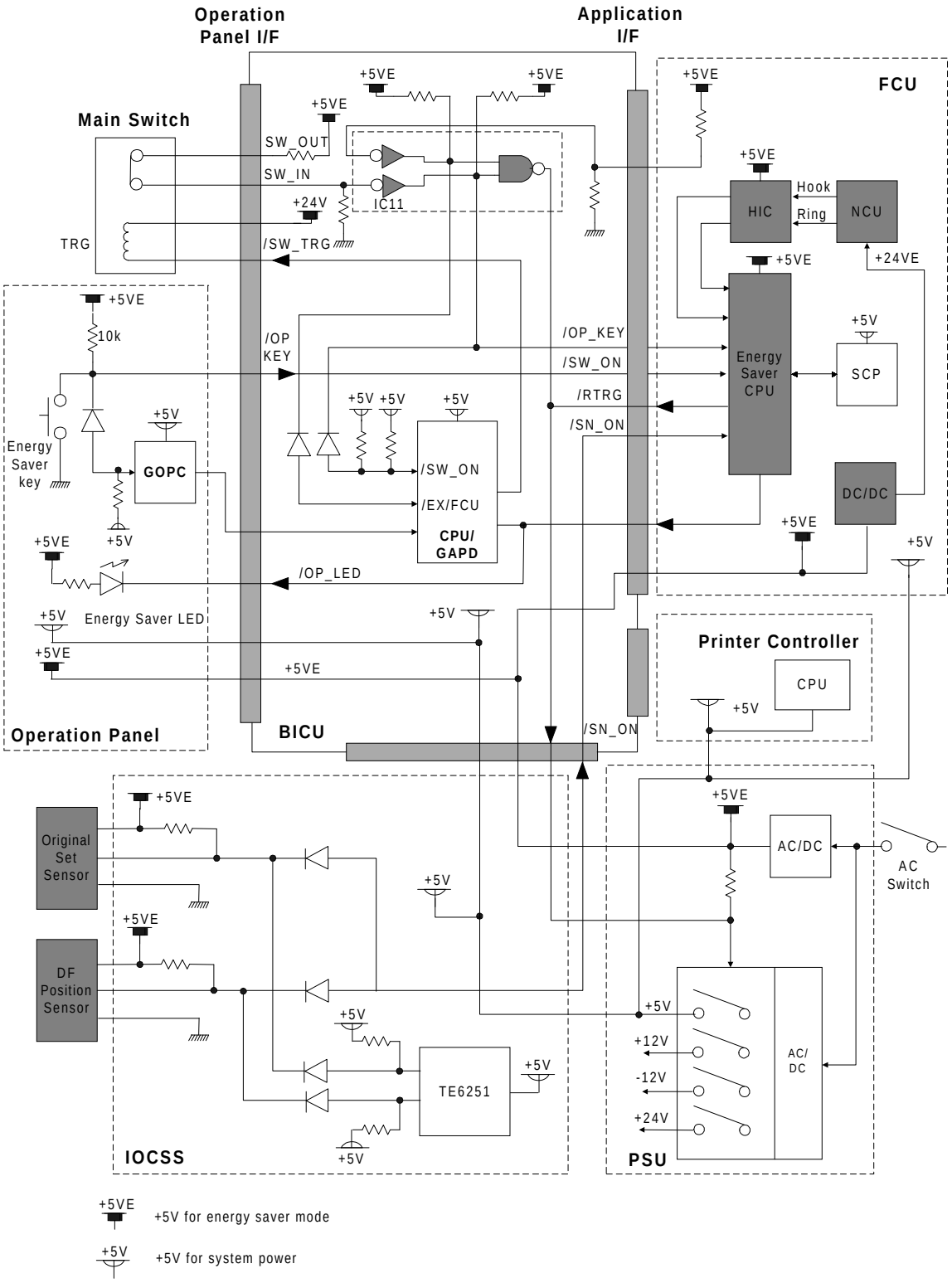
When the main switch has been turned off manually, the CPU requests the PSU to shut down the +5V, +12V, -12V, and +24V supplies.

Fax configurations (Copier/fax and Copier/fax/printer)

The Energy Saver CPU monitors the Clear Modes/Energy Saver Mode key, and controls the Energy Saver LED. When either the Clear Modes/Energy Saver Mode key is pressed or the system auto reset timer runs out, the Energy Saver CPU turns the Energy Saver LED on and requests the copier main CPU to reduce the fusing temperature. When the auto shut off timer runs out, the Energy Saver CPU keeps on the Energy Saver LED, but requests the copier main CPU to cut the fusing lamp power. Then the CPU instructs the PSU to shut down the +5V, +12V, -12V, and +24V supplies.

When the main switch has been turned off manually (night mode), the Energy Saver CPU turns off the Energy Saver LED, and the fusing lamp goes off. When the CPU detects one of the energy saver recovery conditions, it requests the PSU to supply all dc supplies using the /RTRG signal.

- Block Diagram -



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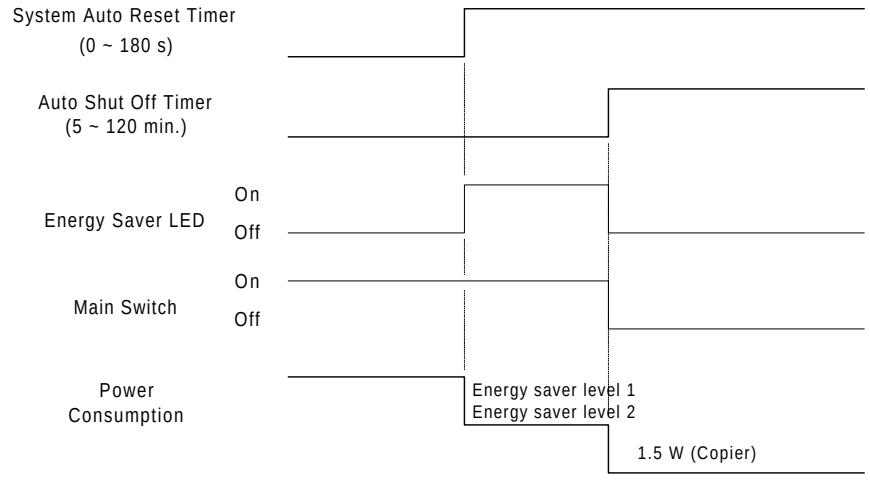
8.6 ENERGY SAVER TIMING CHARTS

1. Auto Energy Saver mode: On Auto Shut Off mode: On

- Copier Configuration -



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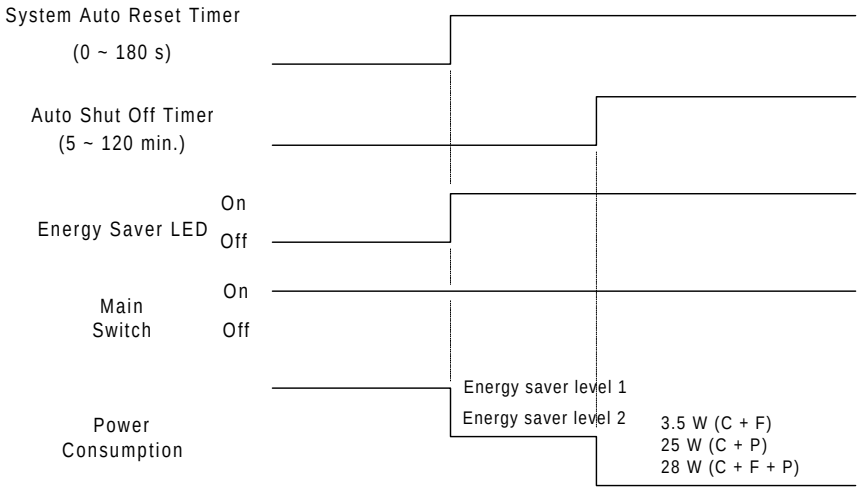
- Copier + Fax and Copier + Fax + Printer Configurations -



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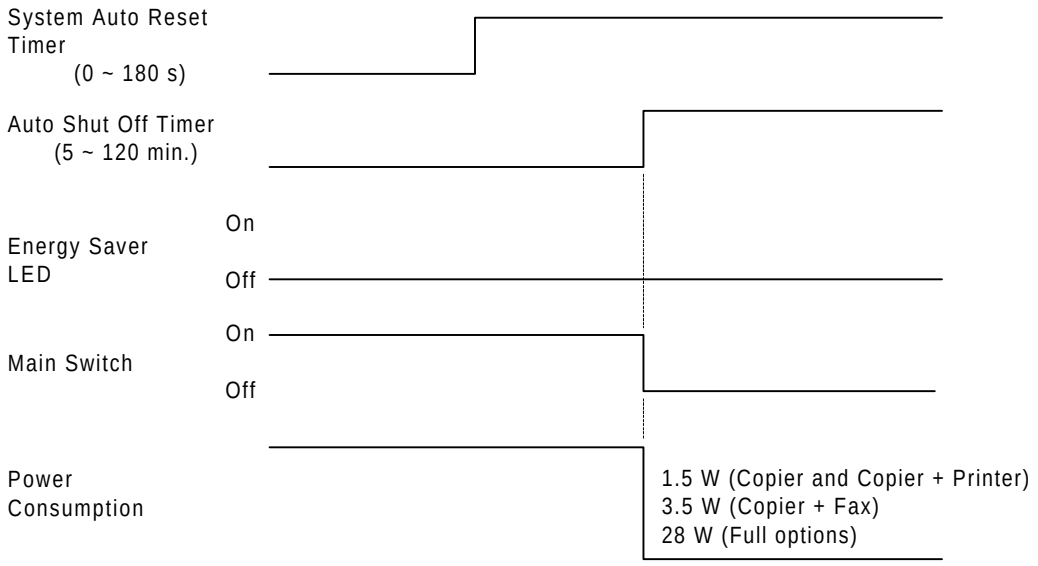
2. Auto Energy Saver mode: Off Auto Shut Off mode: On

- All configurations -



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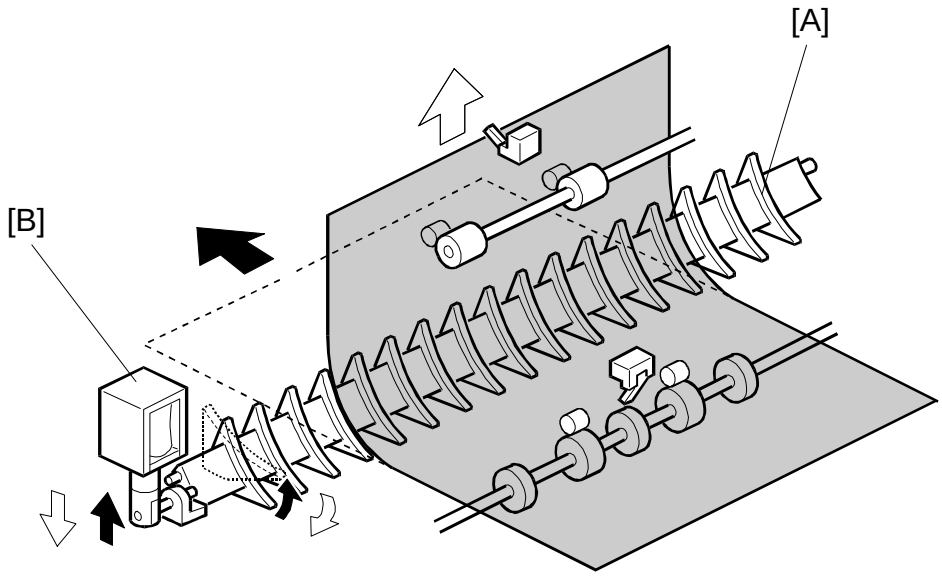
9. PAPER EXIT



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The copy from the fusing unit goes either upwards to deliver the copy paper to the face down tray, or straight through to the face up tray, depending on the junction gate [A].

The junction gate solenoid [B] operates the junction gate. Usually, the junction gate is off and the copy goes up to the face down copy tray. When the junction gate solenoid is energized, the junction gate is opened. Then the copy goes through to the face up copy tray.

SECTION 3

INSTALLATION

1. INSTALLATION REQUIREMENTS

1.1 ENVIRONMENT

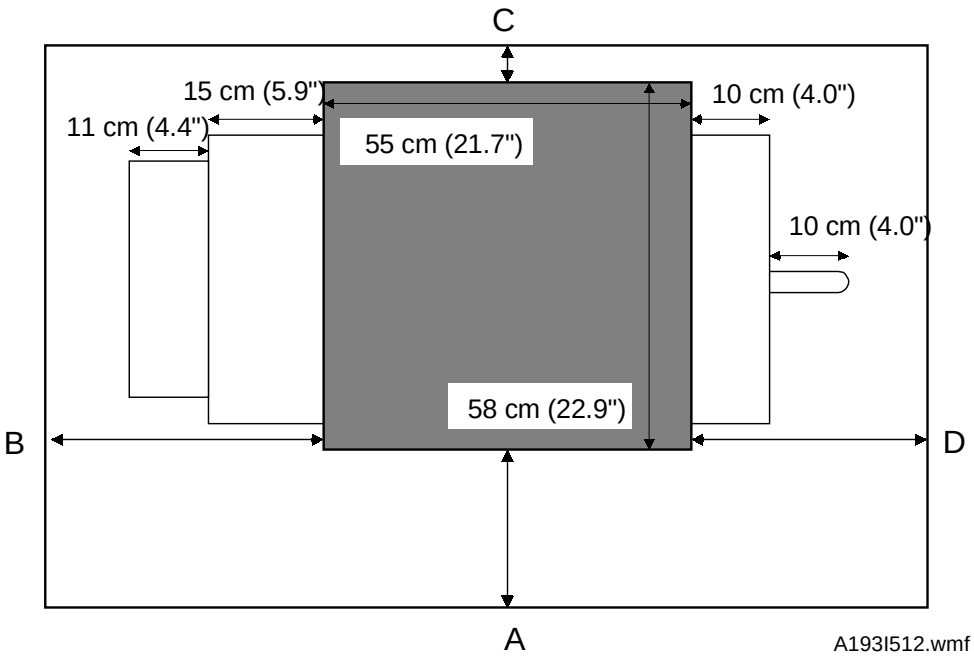
1. Temperature Range: 10 °C to 30 °C (50 °F to 86 °F)
2. Humidity Range: 15 % to 90 % RH
3. Ambient Illumination: Less than 1,500 lux (Do not expose to direct sunlight.)
4. Ventilation: Room air should turn over at least 30 m^3/hr/person
5. Ambient Dust: Less than 0.10 mg/m^3 (2.7 x 10^{-6} oz/yd^3)
6. Avoid an area which is exposed to sudden temperature changes. This includes:
   1) Where it will not be directly exposed to cool air from an air conditioner.
   2) Where it will not be directly exposed to reflected heat from a heater.
7. Do not place the machine in an area where it will be exposed to corrosive gasses.
8. Do not install the machine at any location over 2,000 m (6,500 ft.) above sea level.
9. Place the copier on a strong and level base. (Inclination on any side should be no more than 5 mm.)
10. Do not place the machine where it may be subjected to strong vibrations.

1.2 MACHINE LEVEL

1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

1.3 MINIMUM SPACE REQUIREMENTS

Place the copier near the power source, providing clearance as shown:



A: In front: Over 75 cm (29.6")
B: Left: Over 34 cm (13.4")
C: To rear: Over 1 cm (0.4")
D: Right: Over 31 cm (12.2")

NOTE: The 75 cm recommended for the front space is for pulling out the paper tray only. If an operator stands at the front of the copier, more space is required.

1.4 POWER REQUIREMENTS

⚠ CAUTION

1. Make sure that the wall outlet is near the copier and easily accessible. Make sure the plug is firmly inserted in the outlet.
2. Avoid multi-wiring.
3. Be sure to ground the machine.

1. Input voltage level: 120 V, 60 Hz: More than 10 A
   220 V ~ 240 V, 50 Hz/60 Hz: More than 6 A
2. Permissible voltage fluctuation: 10 %
3. Do not set anything on the power cord.

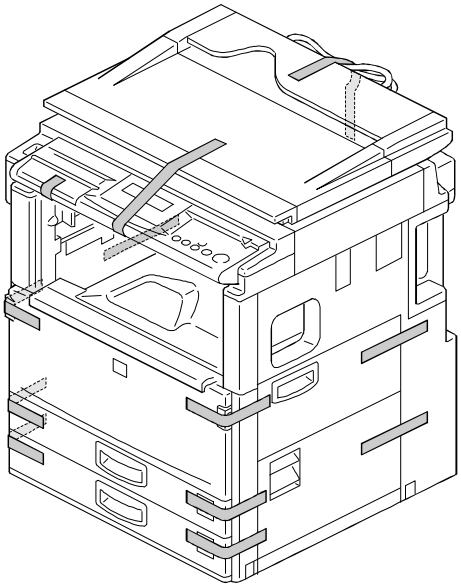
2. COPIER INSTALLATION

2.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

No.	Description	Q'ty
1	Operating Instructions	2
2	User Survey Card (-17 machine only)	1
3	NECR	1

2.2 COPIER INSTALLATION PROCEDURE



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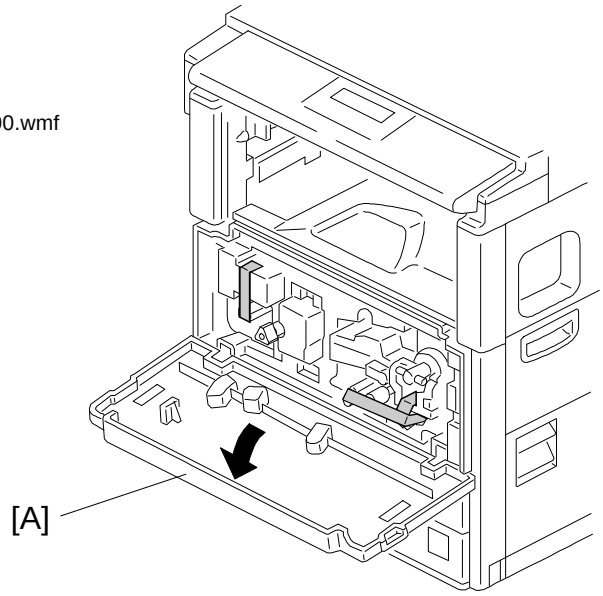

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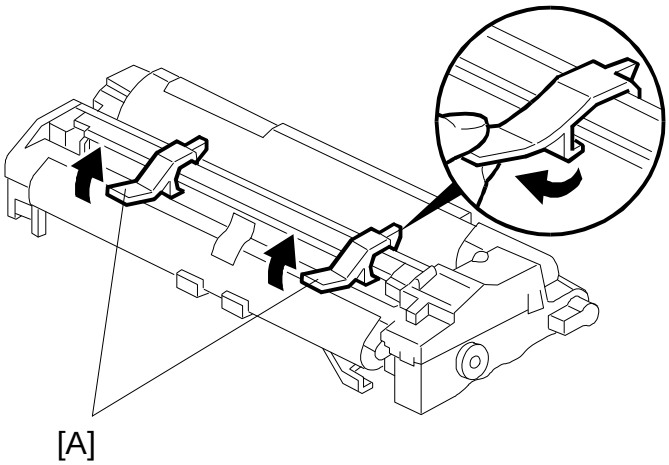
⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Remove the tapes on the exterior of the copier.
2. Open the front cover [A].
3. Remove the tapes inside the copier.



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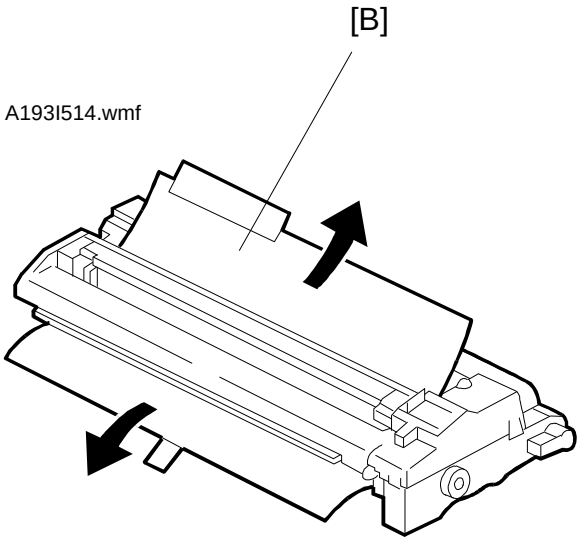

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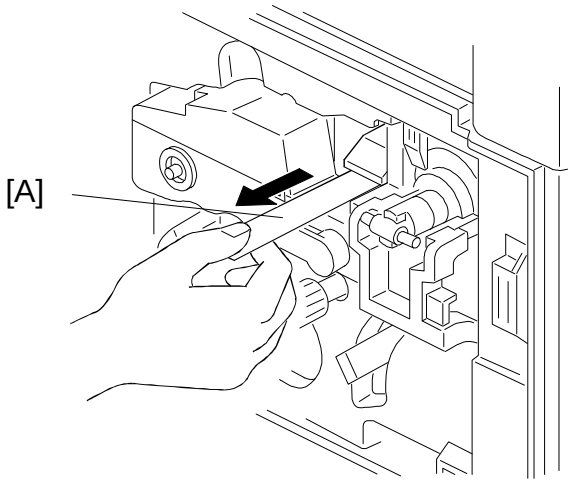
4. Unpack the new PCU.
5. Remove 2 clamps [A] and drum protection sheet [B] from the new PCU.

   NOTE: Do not touch the photoconductor. If you do, copy quality may be abnormal.
6. Insert the new PCU into the machine. Push the new PCU in until the release lever locks.



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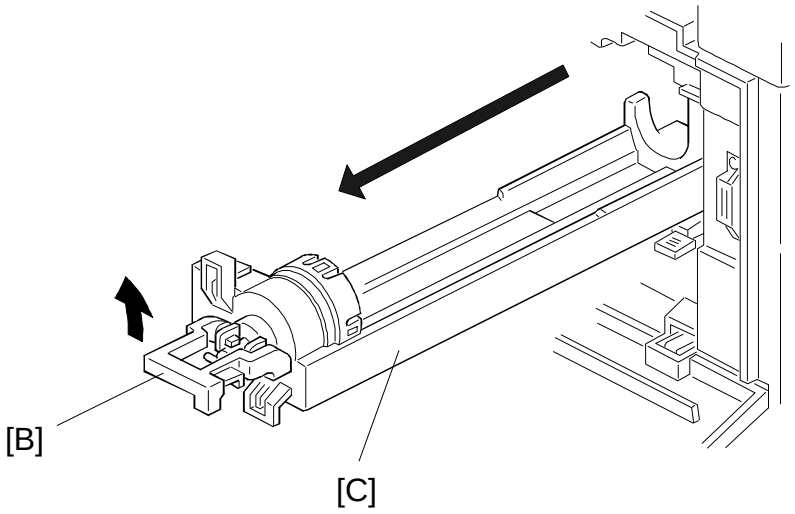

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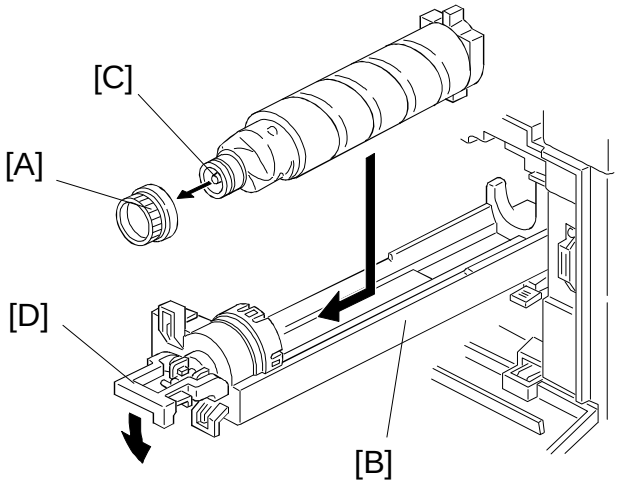
7. Peel the sealing tape [A] off the development unit to install the developer.
8. Raise the toner bottle holder lever [B] and pull the toner bottle holder [C] out.
9. Shake the toner bottle well.

   NOTE: Do not remove the bottle cap of the toner bottle at this time.



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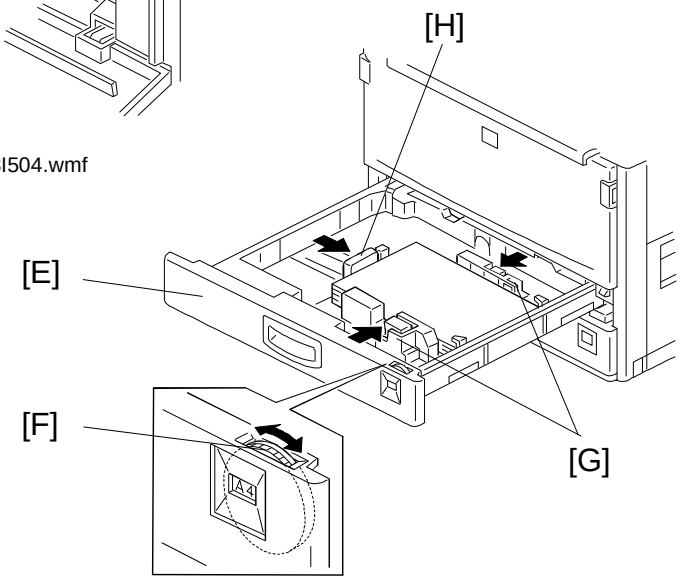

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10. Unscrew the bottle cap [A] and insert the bottle into the holder [B].

    NOTE: Do not open the inner bottle cap [C].

11. Reposition the holder and press down the holder lever [D] to secure the bottle.

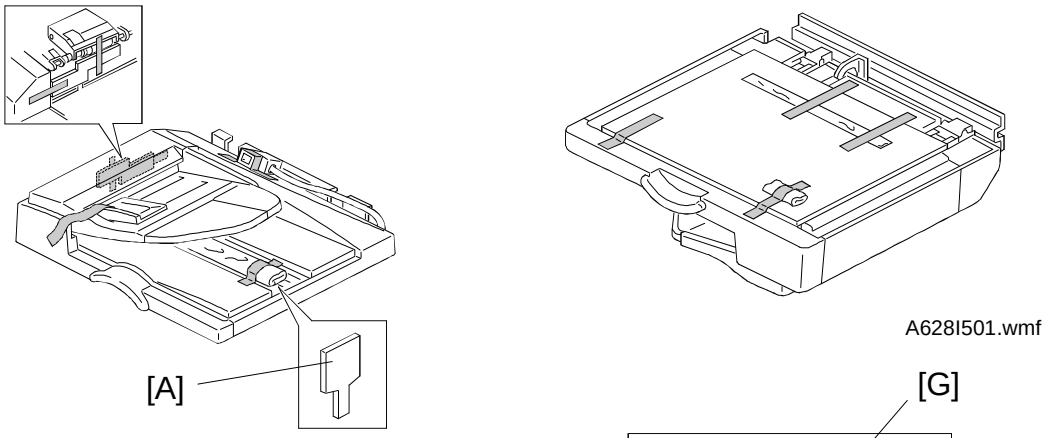
12. Install the optional platen cover if required:
    1) Install two stud screws on the top cover.
    2) Position the platen cover bracket on the stud screws and slide it to the left.

13. Pull the paper tray [E] out and turn the paper size dial [F] to select the appropriate size. Adjust the side guides [G] and end guide [H] to match the paper size.

14. Turn the ac and main switches on. The machine automatically performs TD sensor initial setting. Then, check the copy quality and copying functions.

    NOTE: Do not turn the ac and main switches off or open any covers during the TD sensor initial setting.

2.3 AUTO DOCUMENT FEEDER INSTALLATION



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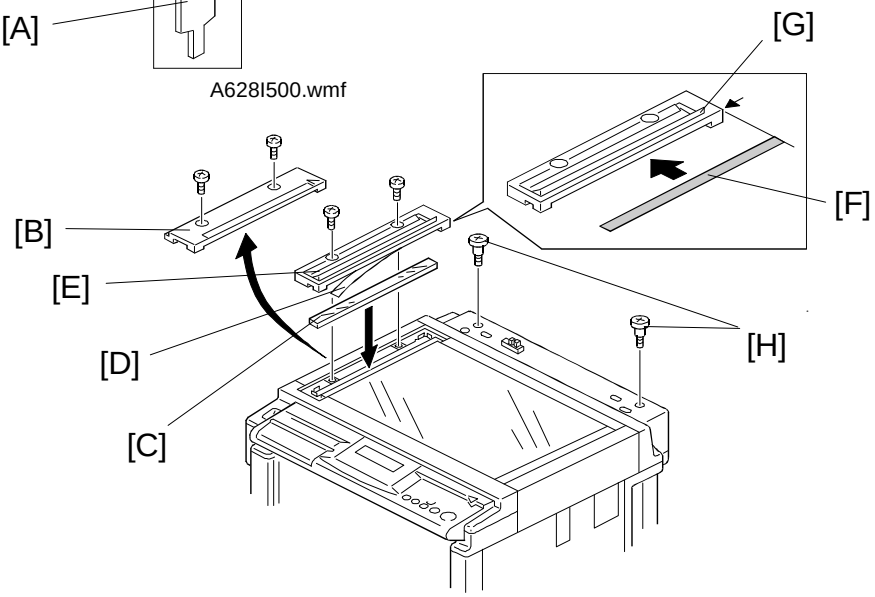

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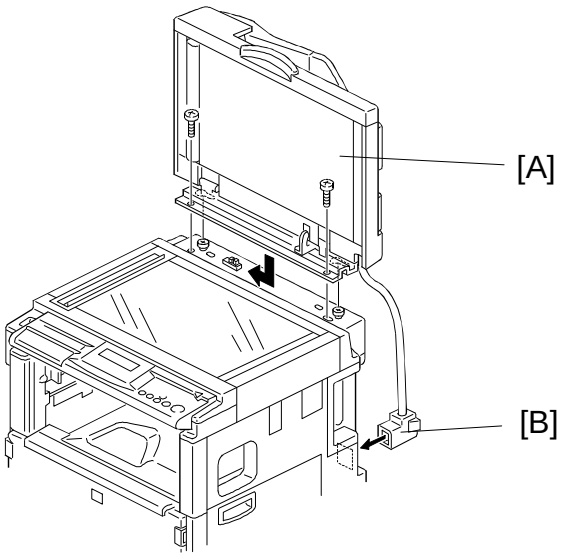
⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

NOTE: When installing the DF, use the tool [A] in the accessory bag or a usual screw driver.

1. Unplug the document feeder. Then, remove all tapes.
2. Remove the left scale [B] (2 screws).
3. Place the DF exposure glass [C] on the glass holder.
4. Peel off the backing [D] of the double side tape attached to the rear side of the scale guide [E], then install the scale guide (2 screws removed in step 2).
5. Attach the original size decal [F] to the scale guide.

   NOTE: Place the decal at the rear edge, and the left side flush with the scale paper guide [G], as shown.
6. Install the stud screws [H] for the DF on the copier.



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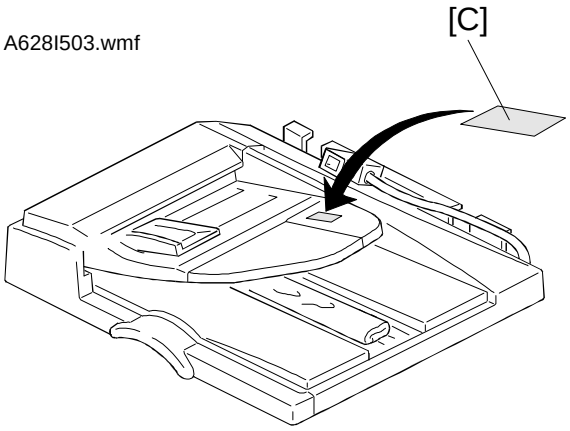

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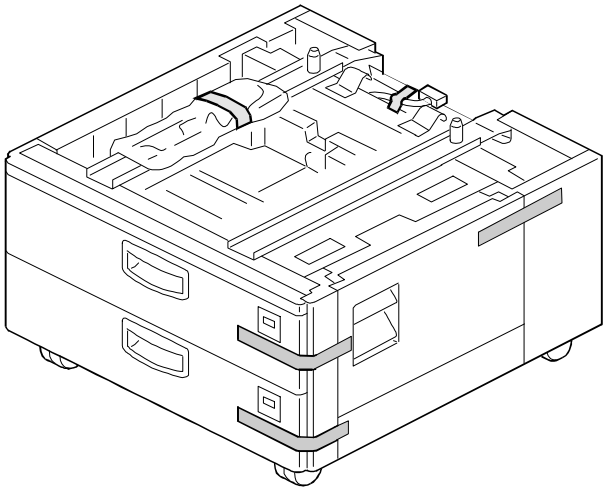
7. Install the DF unit [A].
8. Slide the DF to the left, then secure the DF unit with 2 screws (M4 x 10).
9. Connect the I/F harness [B] to the copier.
10. Attach the original direction decal [C] to the DF table as shown.
11. Turn the ac and main switches on. Then, check if the document feeder works properly.

2.4 PAPER TRAY UNIT INSTALLATION



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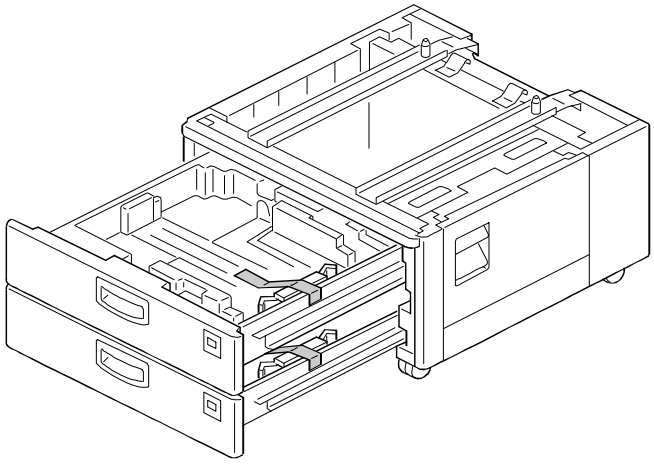

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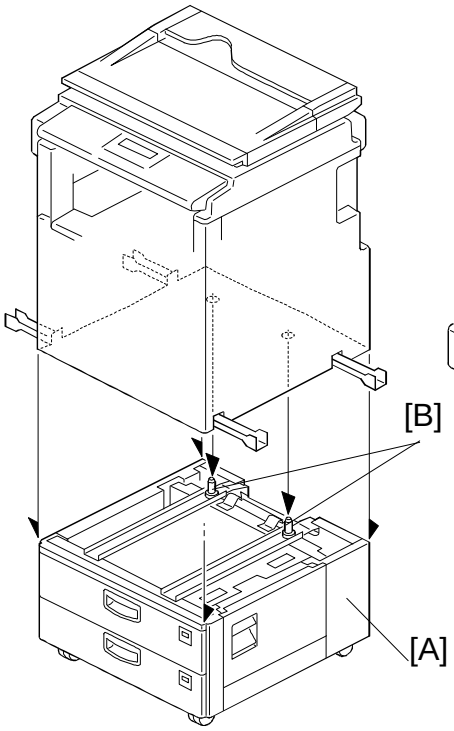
⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Unpack the paper tray unit. Then, remove the tapes (7 tapes).



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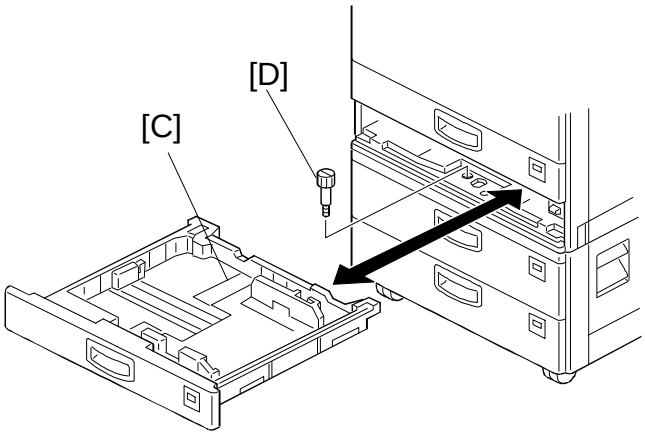

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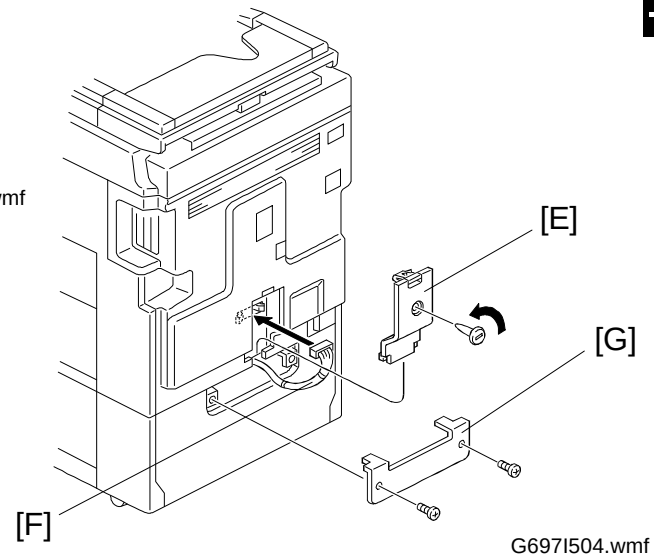

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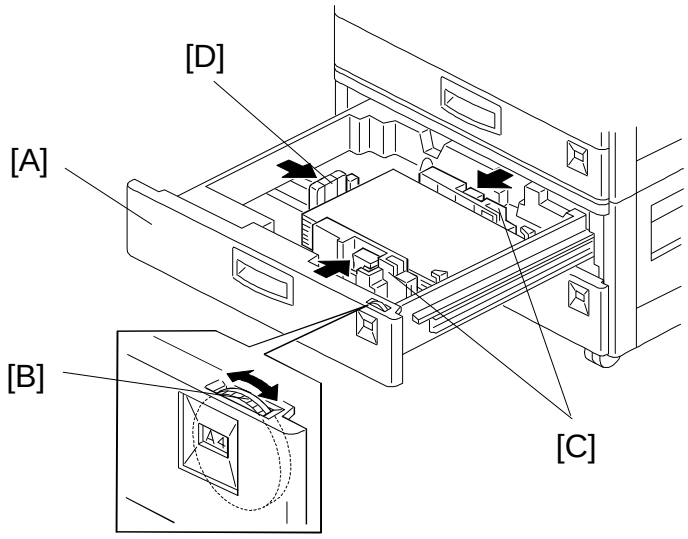
2. Place the copier on the paper tray unit [A] with the pegs [B] fitting into the copier's peg holes.
3. Remove the copier's second paper tray [C].
4. Secure the knob screw [D].
5. Push the copier's second paper tray back into the copier.
6. Remove the connector cover [E].
7. Connect the paper feed unit harness [F] to the copier.
8. Reinstall the connector cover.
9. Secure the joint bracket [G] to the copier (2 screws).

   NOTE: Do not pinch the harness.



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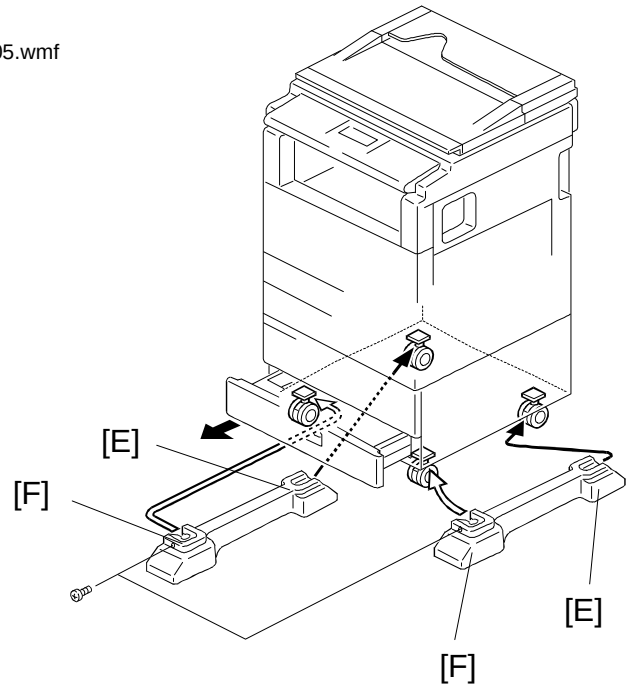

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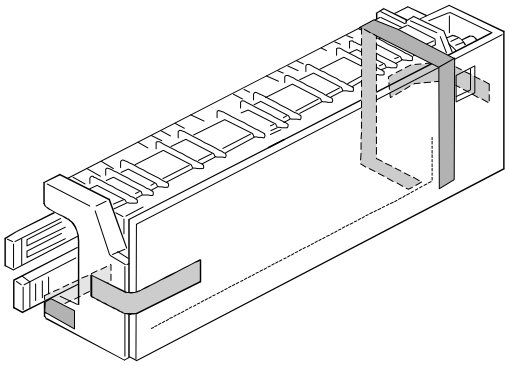
10. Pull out the paper tray [A] and turn the paper size dial [B] to select the appropriate size. Then, adjust the side guides [C] and end guide [D] to match the paper size.
11. Turn the ac and main switches on. Then, check if the paper tray unit works properly.
12. Install the rear hooks of the stands [E] until they snap into place (1 screw).
13. Install the front hooks of the stands [F] until they snap into place (1 screw).

2.5 DUPLEX UNIT INSTALLATION



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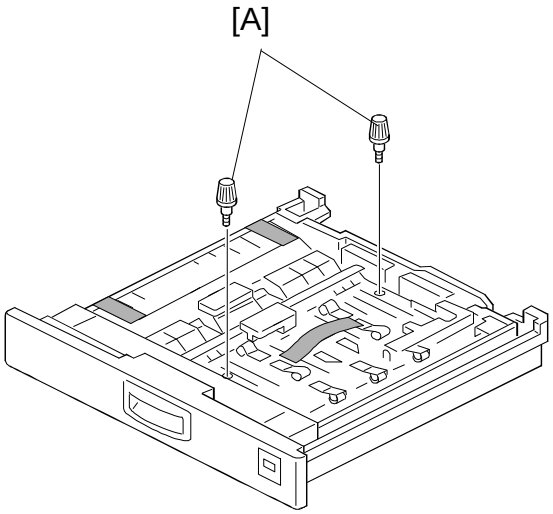

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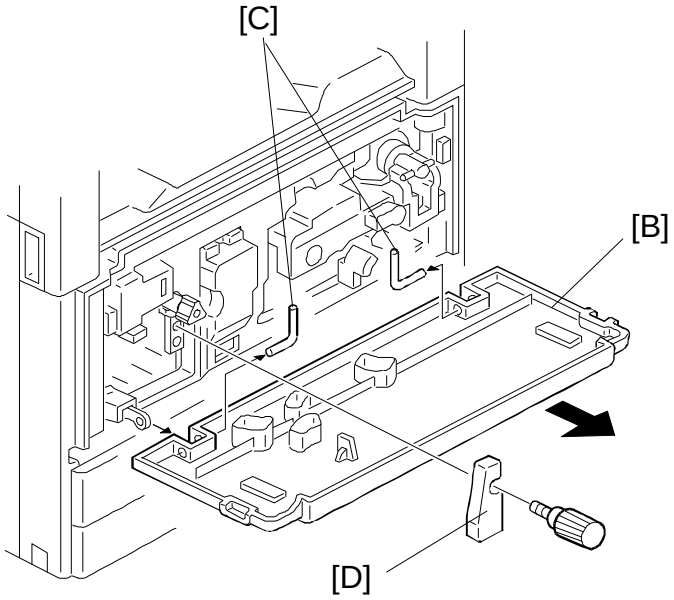
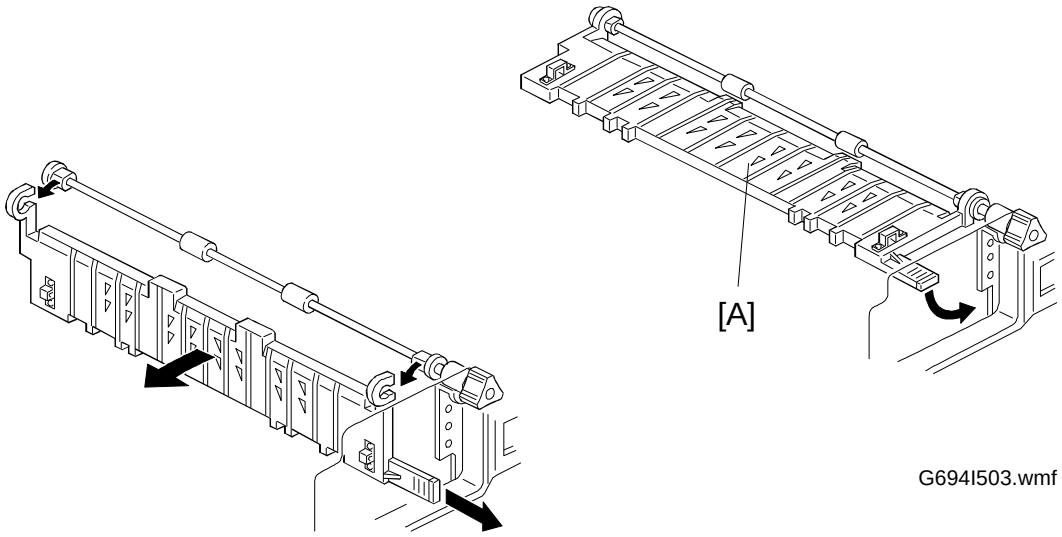


G694I502.wmf

⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Unpack the inverter unit and duplex unit and remove the tapes (7 tapes) and two knob screws [A].
2. Open the front cover [B].
3. Slide the two hinges [C] inward and remove them as shown in the illustration. Then, remove the front cover.
4. Remove the inverter unit cover [D] (1 screw).



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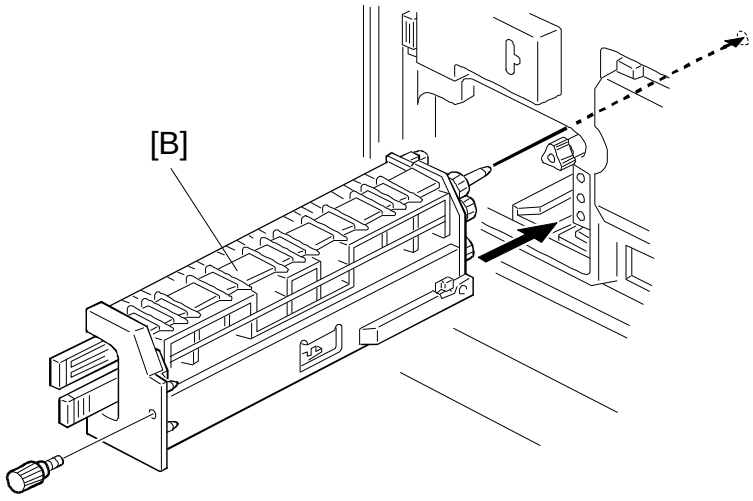

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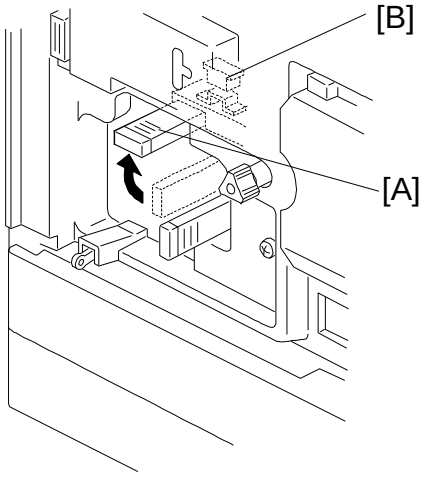
5. Swing the lower transport guide plate [A] down as shown in the illustration.
6. Remove the lower transport guide plate and pull it out as shown in the illustration.
7. Push the inverter unit [B] in until the pin is completely inserted in the pin hole.
8. Secure the inverter unit with the screw which was removed in step 4.



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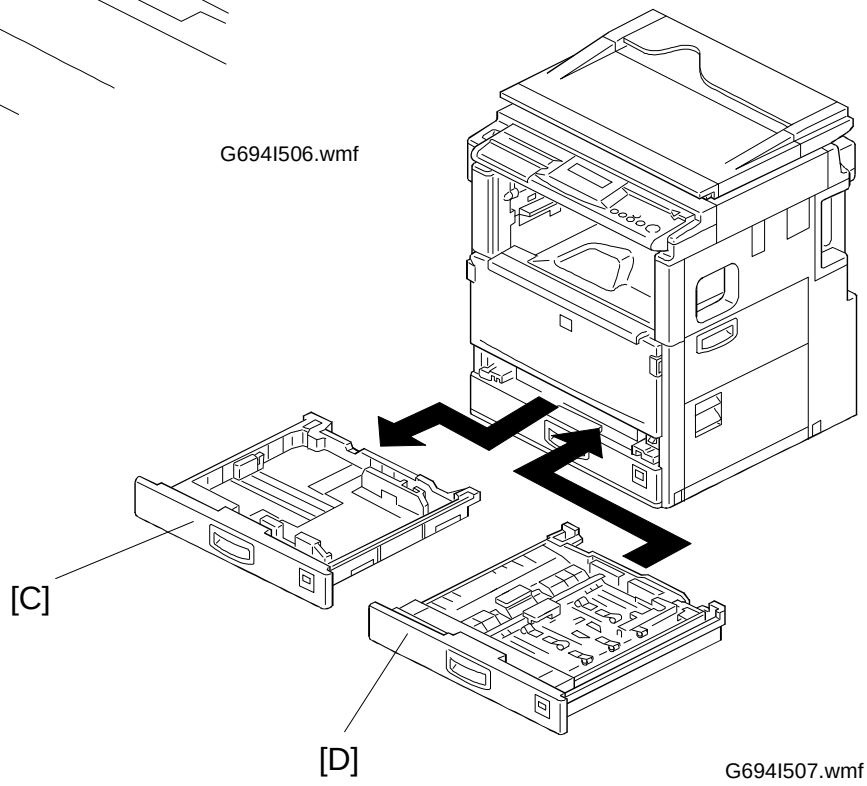

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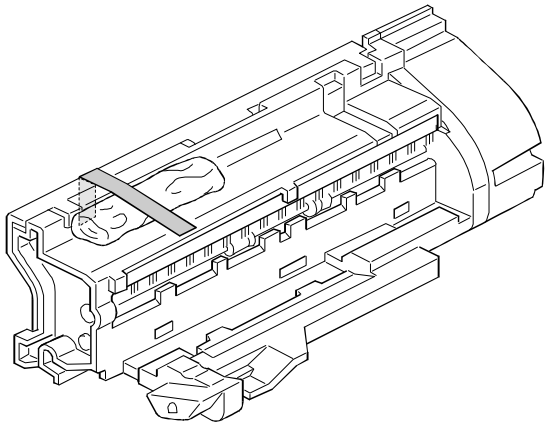
9. Swing the upper inverter guide plate [A] up as shown in the illustration and secure it with the magnets [B] at front and rear.
10. Reinstall the front cover.
11. Pull out the 1st paper tray [C].
12. Push the duplex unit [D] into the place where the 1st paper tray was.
13. Turn the ac and main switches on and check if the duplex unit works properly.

2.6 1-BIN SORTER INSTALLATION



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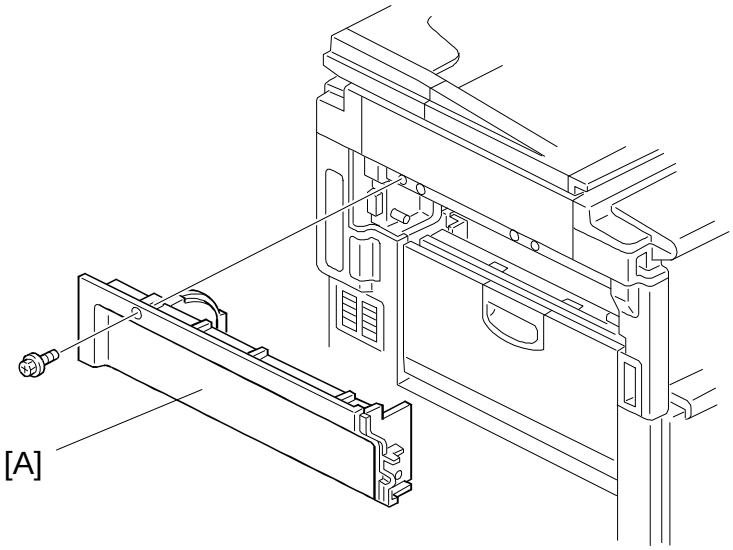
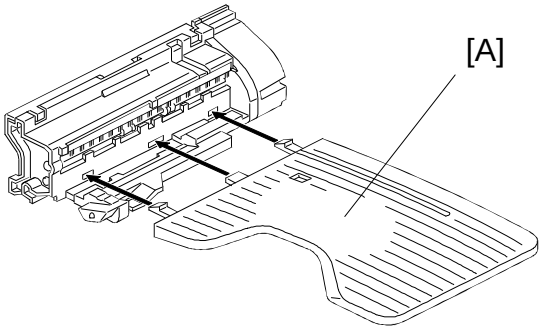


A629I501.wmf

⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Unpack the copy tray and remove the tape.
2. Remove the left upper cover [A] (1 screw).



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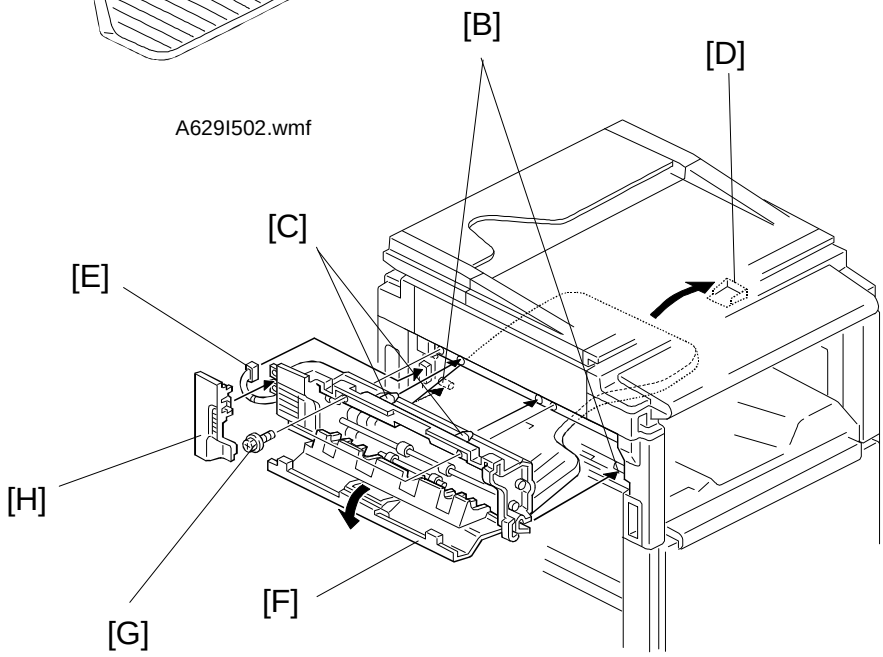

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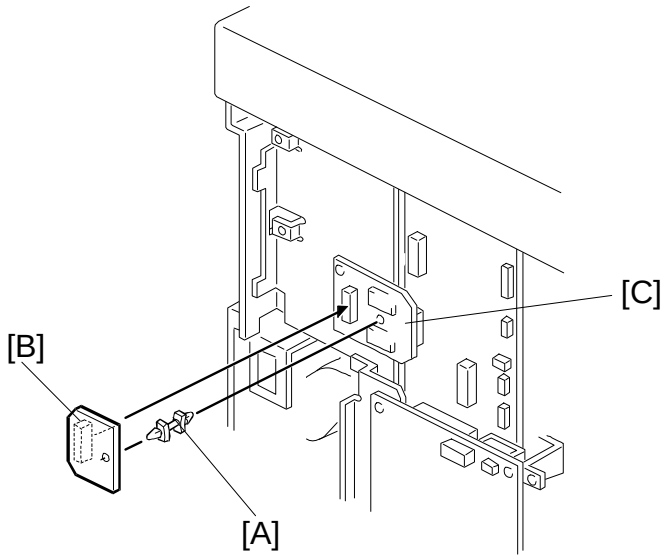
3. Insert the hooks on the 1-bin sorter tray into the slots in the sorter unit [A].
4. Hook the clips on the 1-bin sorter unit onto the stud pins [B] on the copier.
5. Insert the pins [C] into the pin holes in the copier. Make sure to rest the 1-bin sorter tray on the tray support [D].

   NOTE: Do not pinch the I/F harness [E].
6. Open the left cover [F] and secure the unit (2 screws [G]).

   NOTE: Use the screw which was removed in step 2 and the other screw which is packed.
7. Couple the I/F cable connector with the copier.
8. Install the connector cover [H].
9. Turn the ac and main switches on and check if copies are delivered to the 1-bin sorter properly.

2.7 MEMORY BOARD



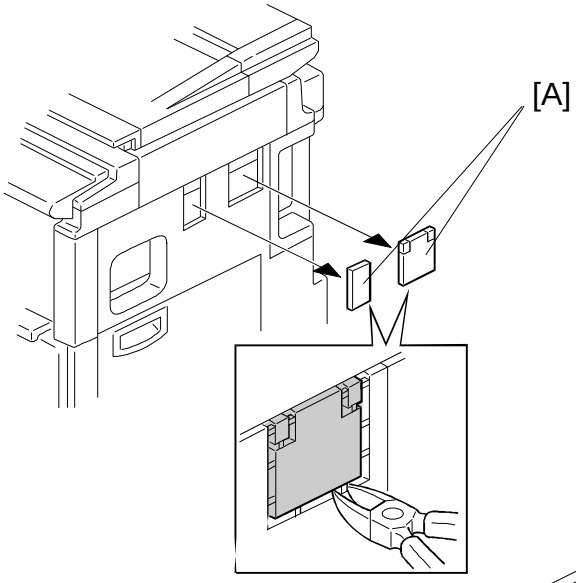
A193I041.wmf

⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Remove the rear cover. (See Rear Cover Removal in Section 6.)
2. Install the spacer [A].
3. Install the memory board [B] on the MSU board [C].
4. Reassemble the machine.

2.8 KEY COUNTER HOLDER INSTALLATION



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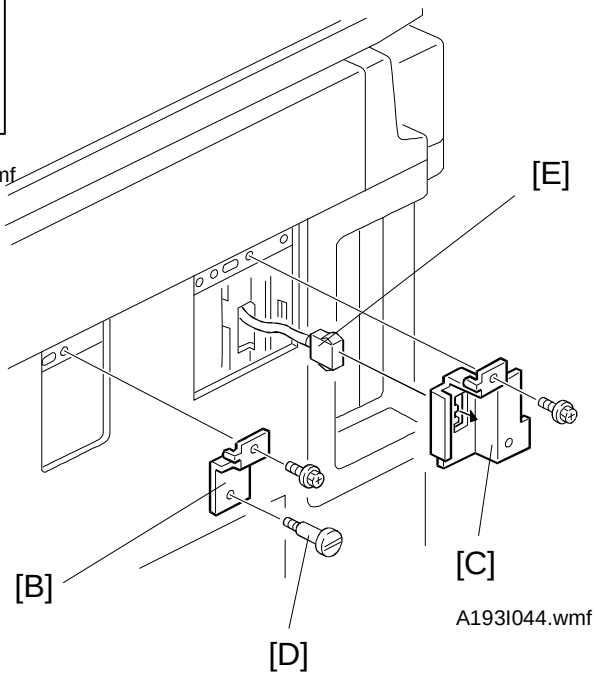

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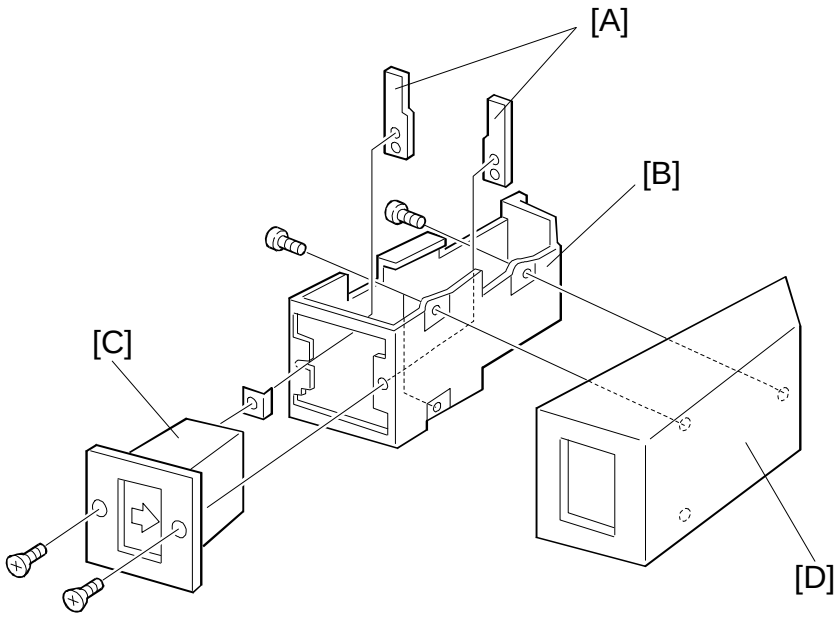
1. Remove the caps [A].
2. Secure the front key counter bracket [B] (1 screw).
3. Secure the rear key counter bracket [C] (1 screw).
4. Install the stepped screw [D] into the front key counter bracket.
5. Plug the connector [E] into the rear key counter bracket.



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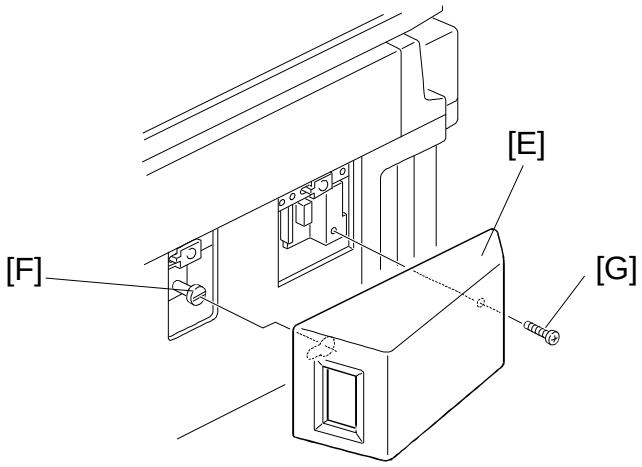
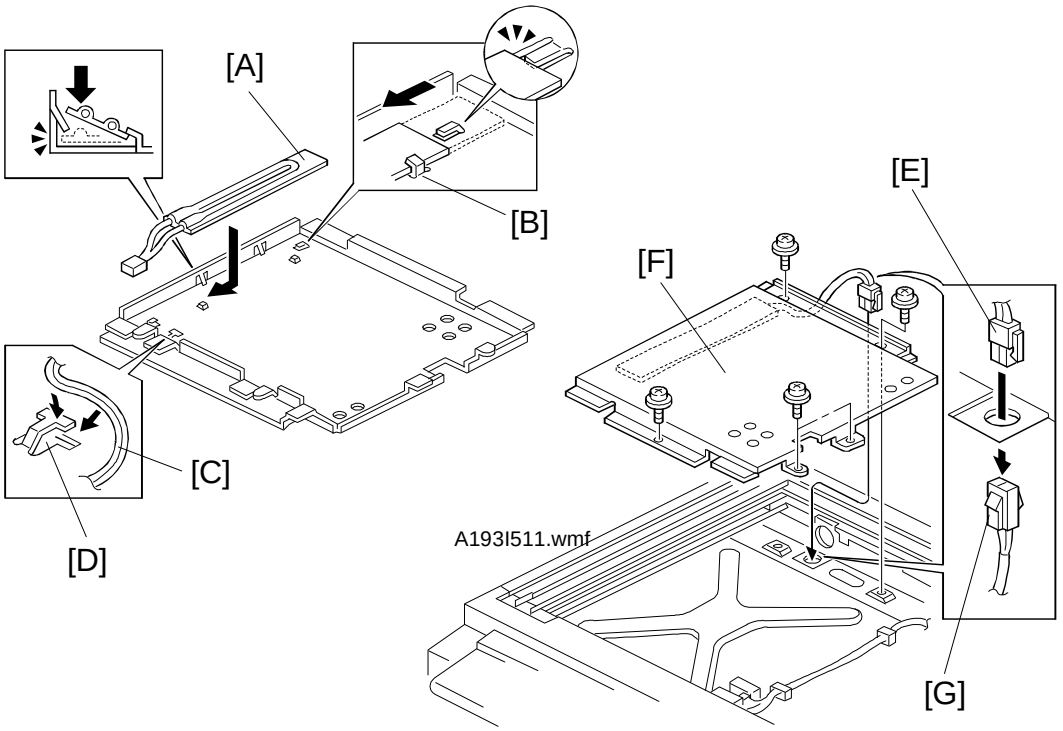


A193I045.wmf

6. Hold the key counter plate nuts [A] on the inside of the key counter bracket [B] and insert the key counter holder [C].
7. Secure the key counter holder to the bracket (2 screws).
8. Install the key counter cover [D] (2 screws).
9. Connect the connector of the key counter holder.
10. Hook the key counter holder assembly [E] onto the stepped screw [F].
11. Secure the key counter holder assembly with a screw [G].

2.9 ANTI-CONDENSATION HEATER INSTALLATION



A193I510.wmf

⚠ CAUTION

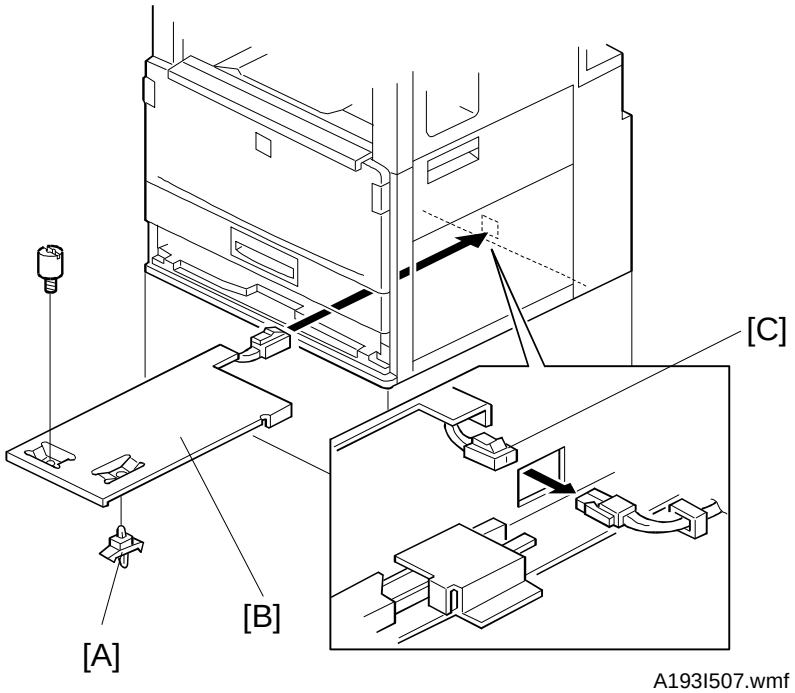
Unplug the copier power cord before starting the following procedure.

1. Remove the rear cover and lens cover. (See Rear Cover Removal and Lens Cover Removal in Section 6.)
2. Hook both ends of the heater [A] onto the clips [B].
3. Push the heater into the two clips.
4. Slide the heater to the left until it clicks into place. Fit the harness [C] into the clip [D].

   NOTE: Leave the clip out to prevent the heater from slipping off.
5. Insert the connector [E] into the hole.
6. Secure the inner cover [F].
7. Couple the connector coming down from the hole with another connector [G] coming up from the printer.

   NOTE: Tell the customer that even when the copier's main switch is turned off, the copier power cord should be plugged in. Otherwise, the heater will not function.

2.10 TRAY HEATER



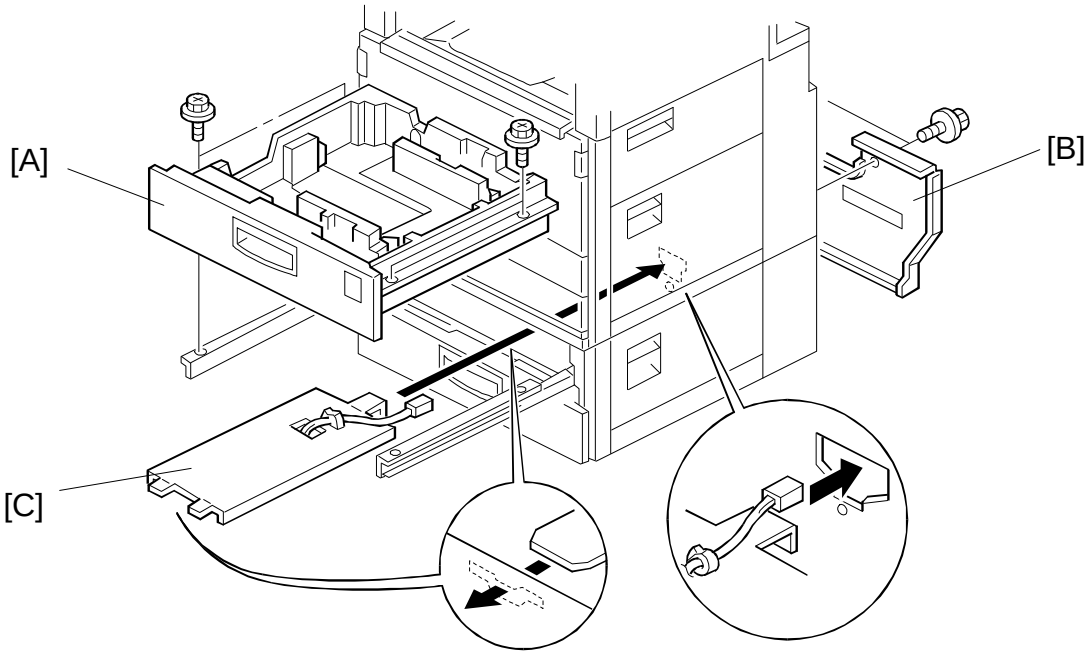
⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Remove the 2nd paper feed tray.
2. Install the clamp [A] on the base. Then, install the tray heater [B] (1 screw).
3. Connect the connector [C] of the heater to the copier's connector [D], which is on the rear frame.
4. Reassemble the machine.
5. Check the printer side-to-side registration (2nd paper tray).

   NOTE: Tell the customer that even when the copier's main switch is turned off, the copier power cord should be plugged in. Otherwise, the tray heater will not function.

2.11 TRAY HEATER (OPTIONAL PAPER TRAY UNIT)

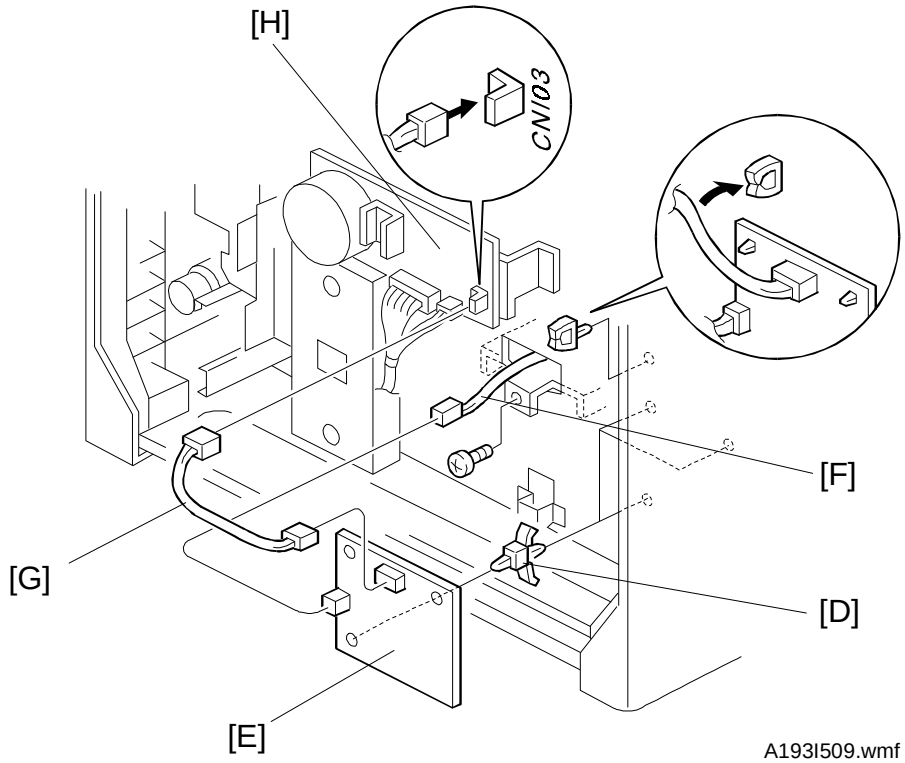


A193I508.wmf

⚠ CAUTION

Unplug the copier power cord before starting the following procedure.

1. Remove the upper paper tray [A] (4 screws).
2. Remove the rear cover [B] (2 screws).
3. Install the tray heater [C] (1 screw)



4. Install 3 clamps [D]
5. Install the interface board [E], and connect the tray heater harness [F] to the interface board. Then, clamp the harness as shown in the illustration.
6. Connect the interface harness [G] to the motor [H] and interface board.
7. Reassemble the machine.
8. Check the printer side-to-side registration (3rd and 4th tray).

NOTE: Tell the customer that even when the copier's main switch is turned off, the copier power cord should be plugged in. Otherwise, the tray heater will not function.

SECTION 4

SERVICE TABLES

1. SERVICE REMARKS

1.1 GENERAL CAUTION

Do not turn off the main switch while any of the electrical components are active. Doing so might cause damage to units, such as the PCU, when they are pulled out of or put back into the copier.

1.2 PCU

The PCU consists of the OPC drum, development unit, charge roller unit, and cleaning unit. Follow the cautions below when handling a PCU.

1. Never touch the drum surface with bare hands. When the drum surface is touched or becomes dirty, wipe it with a dry cloth or clean it with wet cotton. Wipe with a dry cloth after cleaning with the cotton.
2. Never use alcohol to clean the drum; alcohol dissolves the drum surface.
3. Store the PCU in a cool, dry place away from heat.
4. Take care not to scratch the drum as the drum layer is thin and is easily damaged.
5. Never expose the drum to corrosive gases such as ammonia gas.
6. Never shake the PCU. Doing so may cause toner and/or developer to spill out.
7. Do not bend the PCU. Doing so may cause toner and/or developer to spill out.
8. Dispose of used PCUs in accordance with local regulations.
9. Do not touch the charge roller with bare hands. Oil stains may cause black bands on copies due to excessive drum charge.
10. Prevent the charge roller from being exposed to dusty air. Dust on the charge roller may cause white spots on copies due to insufficient drum charge.
11. Never use alcohol or water to clean the drum charge roller. Alcohol or water corrode its surface. Wipe with a dry cloth.

1.3 TRANSFER ROLLER UNIT

1. Never touch the transfer belt surface with bare hands.
2. Take care not to scratch the transfer roller as the surface is easily damaged.

1.4 SCANNER UNIT

2. Clean the exposure glass with alcohol or glass cleaner to reduce the amount of static electricity on the glass surface.
3. Use a cotton pad with water or a blower brush to clean the mirrors and lens.
4. Do not bend or crease the exposure lamp flat cable.
5. Do not disassemble the lens unit. Doing so will throw the lens and the copy image out of focus.
6. Do not turn any of the CCD positioning screws. Doing so will throw the CCD out of position.

1.5 LASER UNIT

1. Do not loosen the screws that secure the LD drive board to the laser diode casing. Doing so would throw the LD unit out of adjustment.
2. Do not adjust the variable resistors on the LD unit, as they are adjusted in the factory.
3. The polygon mirror and F-theta mirror are very sensitive to dust. Never open the optical housing unit.
4. Do not touch the glass surface of the polygon mirror motor unit with bare hands.

1.6 FUSING UNIT

1. After installing the fusing thermistor, make sure that it is in contact with the hot roller and that it rotates freely.
2. Be careful not to damage the edges of the hot roller strippers or their tension springs.
3. Do not touch the fusing lamp and rollers with bare hands.
4. Make sure that the fusing lamp is positioned correctly and that it does not touch the inner surface of the hot roller.

1.7 PAPER FEED

1. Do not touch the surface of the pick-up, feed, and separation rollers.
2. The side fences and end fences of the paper tray must be positioned correctly to align with the actual paper size to avoid paper misfeeds.

1.8 OTHERS

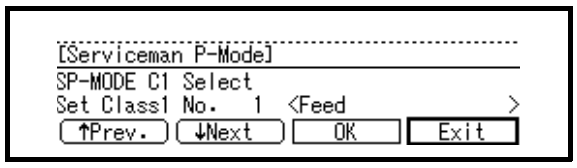
1. The TD sensor initial setting is performed automatically after installing the new PCU and closing the front cover. Never open the front cover or turn off the main switch during this time. The main motor stops when the initial setting has finished.
2. The toner bottle should be replaced while the main switch is on.
3. If the optional tray and anti-condensation heaters have been installed, keep the copier power cord plugged in, even when the copier main switch is turned off. This keeps the heaters energized.

2. SERVICE PROGRAM MODE

2.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data, change modes, and adjust values.

2.1.1 Service Program Access Procedure



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1) How to enter the SP mode

Press the following keys in sequence.

[Interrupt/Copy] → [1] → [0] → [7] → [C/Stop]

Hold the [C/Stop] key for more than 3 seconds.

2) How to exit SP mode

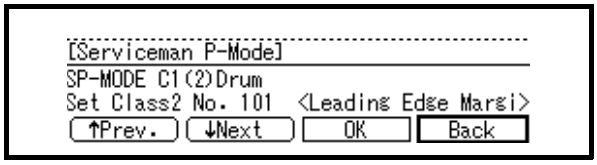
Press the [Interrupt/Copy] key or exit key three times.

2.1.2 Accessing Copy Mode from within an SP Mode

1. Press the Interrupt key.
2. Select the appropriate copy mode and make trial copies.
3. To return to the SP mode, press the Interrupt key again.

2.1.3 How to select the program number

Program numbers are composed of two or three levels.



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To input the required program number, select each program level in sequence.

1. Select the 1st level program number at the numeric key pad and press the # key or OK key.

   NOTE: The 1st level program number can be selected using the arrow keys or Prev key or Next key.

2. Select the 2nd level program number at the numeric key and press the # key or OK key.

   NOTE: The 2nd level program number can be selected using the arrow keys or Prev key or Next key.

3. If there any are third level programs in the SP mode, they can be selected the same way as the 1st and 2nd level SP modes.

   NOTE: The 3rd level program number can be selected using the arrow keys or Prev key or Next key.

2.1.4 To Input a Value or Setting for an SP Mode

1. Enter the required program mode as explained above.
2. Enter the required setting using the numeric keys, then press the # key or OK key.

   NOTE: If you forget to press the # key or OK key, the previous value remains.

3. Exit SP mode.

Service Tables

2.2 SERVICE PROGRAM MODE TABLES

2.2.1 Main SP Mode Table

NOTE: 1) In the Function column, comments are in italics.
2) In the Settings column, the default value is in bold letters.
3) An asterisk " * " after the mode number means that this mode is stored in the NVRAM. If the RAM is reset, all these SP modes will return to their factory settings.

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
1-001 *	1	Leading Edge Registration (Normal copying, and duplex 1st side)	Adjusts the printing leading edge registration using the Trimming Area Pattern (SP5-902, No.10).	+9 ~ -9 0.1 mm/step **+ 0.0 mm**
			Use the •/∗ key to toggle between + and -. The specification is 3 ±2 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.	
	2	Leading Edge Registration (Duplex: 2nd side)	Adjusts the printing leading edge registration using the Trimming Area Pattern (SP5-902, No.10).	+12.5 ~ -12.5 0.1 mm/step **+ 0.0 mm**
			Use the •/∗ key to toggle between + and -. The specification is 3 ±2 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.	
1-002 *	1	Side-to-Side Registration (1st paper feed)	Adjusts the printing side-to-side registration from the 1st paper feed station using the Trimming Area Pattern (SP5-902, No.10).	+9 ~ -9 0.1 mm/step + 0.0 mm
			Use the •/∗ key to toggle between + and -. The specification is 2 *±1.5 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	
	2	Side-to-Side Registration (2nd paper feed)	Adjusts the printing side-to-side registration from the 2nd paper feed station using the Trimming Area Pattern (SP5-902, No.10).	+9 ~ -9 1 mm/step **+ 0.0 mm**
			Use the •/∗ key to toggle between + and -. The specification is 2 ±1.5 mm.	
	3	Side-to-Side Registration (3rd paper feed: Option PFU tray 1)	Adjusts the printing side-to-side registration from the 3rd paper feed station using the Trimming Area Pattern (SP5-902, No.10).	+9 ~ -9 1 mm/step + 0.0 mm
			Use the •/∗ key to toggle between + and -. The specification is 2 ±1.5 mm.	

Mode No.			Function	Settings
Class 1 and 2	Class 3			
1-002 *	4	Side-to-Side Registration (4th paper feed: Option PFU tray 2)	Adjusts the printing side-to-side registration from the 4th paper feed station using the Trimming Area Pattern (SP5-902, No.10). *Use the •/∗ key to toggle between + and -. The specification is 2 ±1.5 mm.*	+9 ~ -9 0.1 mm/step + 0.0 mm
	5	Side-to-Side Registration (By-pass feed)	Adjusts the printing side-to-side registration from the by-pass feed table using the Trimming Area Pattern (SP5-902, No.10). *Use the •/∗ key to toggle between + and -. The specification is 2 ±1.5 mm.*	+9 ~ -9 0.1 mm/step + 0.0 mm
	6	Side-to-Side Registration (Duplex)	Adjusts the printing side-to-side registration from the duplex tray using the Trimming Area Pattern (SP5-902, No.10). *Use the •/∗ key to toggle between + and -. The specification is 2 ±1.5 mm.*	+9 ~ -9 0.1 mm/step **+ 0.0 mm**
1-003 *	1	Paper Feed Timing (Paper Feed Trays)	Adjusts the relay clutch timing at registration. The relay clutch timing determines the amount of paper buckle at registration. (A larger setting leads to more buckling.)	0 ~ 10 1 mm/step **7 mm**
	2	Paper Feed Timing (By-pass)		0 ~ 10 1 mm/step **8 mm**
1-006 *		Double copy registration	Adjusts the position of the second copy from the center line in double copy mode. *Use the •/∗ key to toggle between + and -. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	+9 ~ -9 1 mm/step **+ 0 mm**
1-007 *		By-pass Feed Paper Size Display	Displays the paper width sensor data for the by-pass feed table.	
1-105 *	1	Fusing Temperature Adjustment (Operation)	Adjusts the fusing temperature in the operation mode.	100 ~ 200 *1°C/step* **180°C**
	2	Fusing Temperature Adjustment (Energy Saver Level 2)	Adjusts the fusing temperature in the energy saver level 2 mode. *With a lower value, the machine takes more time to reach the ready condition.*	0 ~ 165 *1°C/step* **140°C (115V machine)** **0°C (230V machine)**
1-106		Fusing Temperature Display	Displays the fusing temperature. *Press the ⊡/⊡ key to exit the display.*	
1-901		Auto Restart Interval	**Do not change the value.**	

Service Tables

Mode No.			Function	Settings
Class 1 and 2	Class 3			
1-902		Fusing Control Frequency Display	Displays the fusing control frequency which is detected by the zero cross signal generator. *Around "50" equals 50 Hz. Around "60" equals 60 Hz.*	
2-001 *		Charge Roller Bias Adjustment	Adjusts the voltage applied to the charge roller. ***Do not change the value.***	-1000 ~ -2500 1 V/step **- 1750 V**
2-101 *	1	Leading Edge Erase Margin (Printing)	Adjusts the leading edge erase margin. *The specification is 3 ±2 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	0 ~ 9 1 mm/step **3.0 mm**
	2	Trailing Edge Erase Margin (Printing)	Adjusts the trailing edge erase margin. *The specification is 2 ±2 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	0 ~ 9 1 mm/step **2.0 mm**
	3	Left Side Edge Erase Margin (Printing)	Adjusts the left side erase margin. *The specification is 2 ±1.5 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	0 ~ 9 1 mm/step **2.0 mm**
	4	Right Side Edge Erase Margin (Printing)	Adjusts the right side erase margin. *The specification is 2 ±1.5 mm. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	0 ~ 9 1 mm/step **2.0 mm**
2-103 *		LD Power Adjustment	Adjusts the LD power. ***Do not change the value.***	-128 ~ +127 1 µW/step **- 103**
2-106*		ID Adjustment for a Test Pattern	Adjusts the image density level for black pixels on test pattern printouts (made with SP5-902).	0 ~ 255 1/step **255**
2-201 *		Development Bias Adjustment	Adjusts the development bias during copying. *This can be adjusted as a temporary measure if faint copies appear due to an aging drum.*	-200 ~ -900 1 V/step **- 600 V**
2-213*		Number of Copies After Toner Near End Detection	Selects the number of copies after toner near-end has been detected.	**0: 50 copies** 1: 20 copies
2-220 *		V_T Display	Displays the TD sensor output voltage. *Press the ⊘/C key to exit the display.*	

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
2-301 *	1 *	Transfer Current Adjustment (Paper Tray)	Adjusts the current applied to the transfer roller during printing from the paper tray. *If the user uses thicker paper, the current may have to be increased to ensure sufficient transfer of toner.*	0: -2 μA **1: 0 μA** 2: +2 μA 3: +4 μA
	2 *	Transfer Current Adjustment (By-pass Feed Table)	Adjusts the current applied to the transfer roller during printing from the by-pass feed table. *If the user uses thicker paper, the current may have to be increased to ensure sufficient transfer of toner.*	0: -2 μA **1: 0 μA** 2: +2 μA 3: +4 μA
	3	Transfer Current Adjustment (Duplex)	Adjusts the current applied to the transfer roller during printing from the duplex tray. *If the user uses thicker paper, the current may have to be increased to ensure sufficient transfer of toner.*	0: -2 μA **1: 0 μA** 2: +2 μA 3: +4 μA
	4	Transfer Current Adjustment (Cleaning)	Adjusts the current applied to the transfer roller during roller cleaning. *If toner remains on the roller after cleaning, increase the current.*	-10 ~ 0 1 μA/step **- 4 μA**
2-801		TD Sensor Initial Setting	Performs the TD sensor initial setting. This SP mode controls the voltage applied to the TD sensor to make the TD sensor output about 2.0 V. *After installing a new PCU, the machine performs this function automatically.* ***Do not use this SP mode.***	**0: No** 1: Yes
2-901*	1	Separation Voltage Adjustment (Front side - leading edge)	Adjusts the discharge brush voltage at the leading edge on the front side. *Increase if the paper is getting wrapped around the drum.*	-1000 ~ -4000 1 V/step **- 2300 V**
	2	Separation Voltage Adjustment (Front side - other areas)	Adjusts the discharge brush voltage on the front side except at the leading edge.	-1000 ~ -4000 1 V/step **- 2300 V**
	3	Separation Voltage Adjustment (Rear side - leading edge)	Adjusts the discharge brush voltage at the leading edge on the rear side. *For the rear side in duplex mode, higher voltage is needed. the paper has more static on it, and there is toner on one side of the paper.*	-1000 ~ -4000 1 V/step **- 3000 V**
	4	Separation Voltage Adjustment (Rear side - other areas)	Adjusts the discharge voltage on the rear side except at the leading edge.	-1000 ~ -4000 1 V/step **- 3000 V**

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
2-902*		FCI Smoothing (Letter Mode)	Selects whether the FCI smoothing function to remove jagged edges is enabled or disabled (this adjustment does not affect fax mode)	0: No (Disabled) **1: Yes (Enabled)**
2-903*	1	LD PWM Laser Pulse Positioning (Independent Pixels)	Selects the laser pulse positioning type that is used for independent black or gray pixels (white pixels to left and right). *Item 3 is not used.*	**0: Center** 1: Right 2: Left 3: Concentrated
	2	LD PWM Laser Pulse Positioning (Left Edge)	Selects the laser pulse positioning type that is used for the the leftmost pixel of a series of black or gray pixels. *Item 3 is not used.*	0: Center **1: Right** 2: Left 3: Concentrated
	3	LD PWM Laser Pulse Positioning (Right Edge)	Selects the laser pulse positioning type that is used for the rightmost pixel of a series of black or gray pixels. *Item 3 is not used.*	0: Center 1: Right **2: Left** 3: Concentrated
	4	LD PWM Laser Pulse Positioning (Continuous)	Selects the laser pulse positioning type that is used for pixels in the middle of a series of black or gray pixels. *Item 3 is not used.*	**0: Center** 1: Right 2: Left 3: Concentrated
2-904*	1	ID Adjustment - Binary Processing Mode (Independent pixel)	Density of independent black or gray pixels in binary processing mode (white pixels to left and right).	0 ~ 255 1/step **128**
	2	ID Adjustment - Binary Processing Mode (Left Edge)	Density of the leftmost pixel of a series of black or gray pixels in binary processing mode.	0 ~ 255 1/step **128**
	3	ID Adjustment - Binary Processing Mode (Right Edge)	Density of the rightmost pixel of a series of black or gray pixels in binary processing mode.	0 ~ 255 1/step **255**
	4	ID Adjustment - Binary Processing Mode (Continuous)	Density of pixels in the middle of a series of black or gray pixels in binary processing mode.	0 ~ 255 1 / step **255**
	The threshold value for binary picture mode is set with SP 4-418. The SP2-904 settings determine how black the black pixels are.			

Mode No.			Function	Settings
Class 1 and 2	Class 3			
2-905		Gradation Type	This is for the designer's test purposes. **Do not change the value.**	
2-907*		Laser Pulse Positioning	Selects the laser pulse position type that is used for test pattern printouts (printed with SP5-902). *Item 3 is not used.*	**0: Center** 1: Left 2: Right 3: Concentrated
2-908		Forced Toner Supply	Forces the toner bottle to supply toner to the toner supply unit for 1.5 minutes. *Toner supply finishes automatically after 1.5 minutes. This process is not normally needed in the field for this model, as the machine can handle most cases where toner runs short temporarily.*	**0: No** 1: Yes
2-909		Forced Charge Roller Cleaning	Forces charge roller cleaning. *After selecting "1", press Enter or [#] to start this feature. Press [C] to stop.*	**0: No** 1: Yes
2-910		Forced Transfer Roller Cleaning	Forces transfer roller cleaning. *After selecting "1", press Enter or [#] to start this feature. Press [C] to stop.*	**0: No** 1: Yes
2-911*		Image Density Selection	Selects the humidity coefficients for determining V_{TREF} and V_{TE} from the TD sensor initial setting output. *This setting can be adjusted by the key operator to make image density lighter or darker (see Replacement and Adjustment - Image Density Adjustment by Key Operator).*	0: Darker 1: Dark **2: Normal** 3: Light 4: Lighter
2-912*		Charge Roller Temperature Correction	Corrects the charge roller temperature. *If a copy with a dirty background is made, this value should be increased. However, **do not use this SP mode unnecessarily.***	-5 ~ +5 1 (25V)/step **0**
2-913*		Auto TD Sensor Initial Setting Mode	Selects whether or not the TD sensor initial setting process is performed automatically at installation. *Select "No" if the PCU detection mechanism has a problem. However, **usually do not use this SP mode.***	0: No **1: Yes**
2-916*		Printer γ Table (GAVD) Selection	Selects the printer γ table (GAVD) type. *This SP mode is only effective in the grayscale processing mode.* *A larger value gives a darker image.*	1 ~ 4 1/Step **2**
2-980		Humidity Sensor Output Display	Displays the humidity sensor output data in hex code as %Rh.	

Service Tables

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
2-995*	1	TD Sensor Control Value Display (Factory)	Displays the TD sensor control value (V_{CONT}), which was adjusted in the factory. The machine normally uses this value, unless SP 2-999 is changed away from 0.	
	2	Factory V_{CONT} Counter	Displays what the total counter value was when the TD sensor control value was adjusted in the factory. *When V_{CONT} is adjusted at the factory, the counter is automatically set at "9999999".*	
2-996*	1	TD Sensor Control Value Setting	Inputs the TD sensor control value (V_{CONT}) *If the V_{CONT} voltage is out of specification after replacing the IOCSS board, adjust V_{CONT} using this SP mode. After changing this value, SP2-999 should be set at "1". See "Replacement and Adjustment - IOCSS Board".*	80 ~ 170 1/step **140**
	2	Manual V_{CONT} Counter	Displays what the total counter value was when the TD sensor control value was adjusted in the field.	
2-997*	1	TD Sensor Control Value Display (Installation)	Displays the TD sensor control value (V_{CONT}) which was adjusted at installation. The machine uses this value only if SP 2-999 is set to 2.	
	2	Installation V_{CONT} Counter	Displays what the total counter value was when the TD sensor control value was adjusted at machine installation.	
2-998*		Printer Main Scan Magnification	Adjusts the magnification in the main scan direction for the printer. *Use the •/* key to toggle between + and -. The specification is ± 1%. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 0.5 ~ + 0.5 0.1%/step **0.0 %**
2-999*		TD Sensor Control Value Selection	Selects the TD sensor control voltage *If the V_{CONT} value is out of specification after replacing the IOCSS board, this value should be changed to "1" after inputting the correct value with SP 2-996. See "Replacement and Adjustment - IOCSS Board".*	**0: Factory** 1: Manual 2: Installation Never select 2.
4-008 *		Main Scan Magnification (Scanning)	Adjusts the magnification in the main scan direction for scanning. *Use the •/* key to toggle between + and -. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 1.0 ~ + 1.0 0.5 %/step **+ 0.0 %**

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
4-010 *		Leading Edge Registration (Scanning)	Adjusts the leading edge registration for scanning. *(-): The image moves in the direction of the leading edge* *Use the •/∗ key to toggle between + and -.* *See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 2.0 ~ + 9.0 0.5 mm/step **+ 0.0 mm**
4-011 *		Side-to-side Registration (Scanning)	Adjusts the side-to-side registration for scanning. *(-): The image disappears at the left side.* *(+): The image appears.* *Use the •/∗ key to toggle between + and -.* *See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 6.0 ~ + 6.0 0.1 mm/step **+ 0.0 mm**
4-012 *	1	Leading Edge Erase Margin (Scanning)	Adjusts the leading edge margin for scanning. *Do not adjust this unless the user wishes to have a scanner margin that is greater than the printer margin.*	0.0 ~ 9.0 0.1 mm/step **1.0 mm**
	2	Trailing Edge Erase Margin (Scanning)	Adjusts the trailing edge margin for scanning. *See the comment for SP 4-012-1.*	0.0 ~ 9.0 0.1 mm/step **1.0 mm**
	3	Left Side Erase Margin (Scanning)	Adjusts the left side margin for scanning. *See the comment for SP 4-012-1.*	0.0 ~ 9.0 0.1 mm/step **1.0 mm**
	4	Right Side Erase Margin (Scanning)	Adjusts the right side margin for scanning. *See the comment for SP 4-012-1.*	0.0 ~ 9.0 0.1 mm/step **1.0 mm**
4-013		Scanner Free Run	Performs a scanner free run with the exposure lamp on. *After selecting "1", press Enter or # twice to start this feature. Press C/⊗ to stop.*	**0: No** 1: Yes
4-015*	1	White Plate Scanning Start Position	Adjusts the scanning start position on the white plate for auto shading. *The default is 6 mm from the leading edge. The setting specifies how far scanning starts from the default position.*	- 3.0 ~ + 6.0 0.5 mm/step **0 mm**
	2	White Plate Scanning Area	Adjusts the width of the area on the white plate (in the sub scan direction) that is scanned for auto shading. *The default is 5 mm (for 41 - 400% reproduction ratios) or 6.5 mm (25 - 40%). The current setting specifies the difference from these defaults.*	- 3.0 ~ + 6.0 0.5 mm/step **0 mm**

Mode No.			Function	Settings
Class 1 and 2	Class 3			
4-101*		Sub Scan Magnification (Scanning: Book Mode)	Adjusts the magnification in the sub scan direction for scanning. If this value is changed, the scanner motor speed is changed. *Use the •/∗ key to toggle between + and -. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 1.0 ~ + 1.0 0.5 %/step **+ 0.0 %**
4-301		APS and Platen/DF Sensor Output Display	Displays the status of the APS sensors and platen/DF cover sensor. *See "APS and Platen/DF Sensor Output Display" after the SP mode table.*	
4-303 *		APS Small Size Original Detection	Selects whether or not the copier determines that the original is A5 size when the APS sensor does not detect the size. *If "A5 lengthwise" is selected, paper sizes that cannot be detected by the APS sensors are regarded as A5 lengthwise. If "Not detected" is selected, "Original size" will be displayed.*	**0: No (Not detected)** 1: Yes (A5 lengthwise)
4-401*		Binary Processing Mode (Neg./Pos.)	**Japanese Version Only.** **Do not change the value**.	
4-402*		Binary Processing Mode (Marker Mode)	**Japanese Version Only.** **Do not change the value**.	
4-403*		Gradation Processing Mode for One-to-one Copying	Selects whether binary picture processing or grayscale processing mode is done. *For example, if binary processing mode is selected, all image processing is handled using binary picture processing mode. Note that memory copying always uses binary picture processing, regardless of this setting.*	**0: No (Grayscale processing)** 1: Yes (Binary processing)
4-406*		Marker Detection	**Japanese Version Only.** **Do not change the value**.	

Mode No.			Function	Settings
Class 1 and 2	Class 3			
4-407*	1	MTF Filter Selection in Letter Mode (25% ~ 64%)	Selects the MTF filter level for Letter mode. A stronger filter gives sharper lines. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 11 1/step **4**
	2	MTF Filter Selection in Letter Mode (65% ~ 154%)	Selects the MTF filter level for Letter mode. A stronger filter gives sharper lines. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 11 1/step **7**
	3	MTF Filter Selection in Letter Mode (155% ~256%)	Selects the MTF filter level for Letter mode. A stronger filter gives sharper lines. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 11 1/step **3**
	4	MTF Filter Selection in Letter Mode (257% ~ 400%)	Selects the MTF filter level for Letter mode. A stronger filter gives sharper lines. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 11 1/step **10**
	5	Smoothing Filter Selection in Photo Mode	Selects the smoothing filter level for Photo mode. A stronger filter gives a smoother image. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 8 1/step **3**
	6	MTF Filter Selection in Letter/Photo Mode	Selects the MTF filter level for Letter/Photo mode. A stronger filter gives sharper lines. *For how to adjust, refer to "Detailed Descriptions - Filtering and Main Scan Magnification/Reduction".* ***Never select "1".***	0 ~ 11 1/step **2**
4-410*		AGC Default Setting	Not used ***Do not change the value.***	- 5 ~ 2 1/step **0**

Service Tables

Mode No.			Function	Settings
Class 1 and 2	Class 3			
4-412*		Video Data Path	Selects one of the following video data outputs, which will be used for printing. **0. Normal video processing** 1. After auto shading processing 2. After MTF processing 3. After gamma correction 4. Data straight through (no video processing)	
			Do not change the value.	
4-417		IPU Test Pattern Print	Prints the test pattern for the IPU or selects one of the following video data outputs for printing. **0. No Print** 1. Grayscale 1 2. Grayscale 2 3. Vertical Bands 4. Vertical Line - 1 dot 5. Vertical Line - 2 dot 6. Grid Pattern 7. SBU Test 1 8. SBU Test 2 9. SBU Test 3	
			Change to the copy mode display by pressing the "Interrupt" key, then print the test pattern.	
4-418*	1	Threshold Level in Letter Mode	Selects the threshold level for Letter Mode - *Binary picture processing mode*	0 ~ 255 1/step 48
	2	Threshold Level in Letter/Photo Mode	Selects the threshold level for Letter/Photo Mode - *Binary picture processing mode*	0 ~ 255 1/step 240
4-419*	1	Threshold Level for Marker Mode (Main scan magnification)	**Japanese version only.**	
	2	Threshold Level for Marker Mode (Sub scan magnification)		

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
4-421*	1	Dither Pattern Selection (Grayscale Mode/Photo Mode)	Selects the dither pattern used in grayscale processing mode. *A greater number of lines gives a more detailed copy. If the value is changed, the UP mode setting is also changed.*	**0: 180-line** 1: 140-line 2: 95-line
	2 *	Dither Pattern Selection (Binary Picture/Photo Mode)	Selects the dither pattern used in binary picture processing mode. *A greater number of lines gives a more detailed copy. If the value is changed, the UP mode setting is also changed.*	0: 95-line 1: 70-line **2: 140-line**
4-902		Exposure Lamp On	Turns on the exposure lamp. *To turn off the exposure lamp, select "0".*	**0: No (Off)** 1: Yes (On)
4-904*		SBU Gain Adjustment	Adjusts the coefficient of the D/A converter for the standard AGC gain curve ***Do not adjust this value.*** *However, after performing the memory all clear (SP5-801), use it to re-input the previous value.*	0 ~ 255 1/step **30**
4-905*		SBU DC Count Adjustment	Adjusts the coefficient of the D/A converter for the AGC gain curve for dc count. ***Do not adjust this value.*** *However, after performing the memory all clear (SP5-801), use it to re-input the previous value.*	0 ~ 255 1/step **30**
4-906*		SBU Reference Value Adjustment	Adjusts the coefficient of the D/A converter for the AGC gain curve for scanning the white plate. ***Do not adjust this value.*** *However, after performing the memory all clear (SP5-801), use it to re-input the previous value.*	0 ~ 255 1/step **147**
4-907*		SBU Offset Value Adjustment	Adjusts the coefficient of the D/A converter for the offset (Z/C) for the analog image data processing ***Do not adjust this value.*** *However, after performing the memory all clear (SP5-801), use it to re-input the previous value.*	0 ~ 255 1/step **180**
4-908*		SBU Auto Adjustment	Performs the auto scanner adjustment. *Using this SP mode after replacing the white plate or the memory on the BICU board. See "Replacement and Adjustment - Standard White Level" for details on how to do this.*	**0: Normal operation** 1: Start the adjustment
4-909*		EDU Test Mode	**Japanese version only.** **Do not change the value.**	

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
4-910*		Scanner Motor Control Method	Selects the scanner motor control method. *If "1" is selected, the current for the scanner motor will be reduced and jitter copy image problems will be alleviated. However, copy speed will be reduced.*	**0: Normal** 1: Special
4-912*	1	White Level Value Display (Current)	Displays the current white level value.	
	2	White Level Value Display (Factory)	Displays the white level value for the white plate scanned at the factory.	
4-913*		Shading Interval Time in DF mode	Adjusts the interval for shading processing in DF mode. *Light and heat may affect the scanner response. If copy quality indicates that white level is drifting during a DF copy job, reduce this setting.*	0 ~ 60 1 s/step **30 s**
5-001*		All Indicators On	Turns on all indicators on the operation panel. *Press [#] to check.* *Press [C] to exit this SP mode.*	
5-103*		Auto Paper Tray Shift	Selects whether auto paper tray shift is done or not.	**0: No** 1: Yes
5-104 *		A3/11"x17" Double Count	Specifies whether the counter is doubled for A3/11"x17" paper. *If "YES" is selected, the total counter (mechanical counter) and the current user code counter counts up twice when A3/11"x17" paper is used.*	**No** Yes
5-106 *		ADS Level Selection	Selects the image density level that is used in ADS mode.	1 ~ 7 1 notch/step **4**
5-113*		Option Counter Type	**Japanese version only.** **Do not change the value.**	
5-116*		Total Counter Up Timing	Determines whether the total counter counts up at paper feed-in or at paper exit.	**0: Feed-in** 1: Exit

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
5-401*	1	User Code Mode (Copier)	Selects whether the user code function is enabled in copy mode or not. *If this value is changed, the UP mode setting is also changed.*	**0: No** 1: Yes
	2	User Code Mode (Fax)	Selects whether the user code function is enabled in facsimile mode or not. *If this value is changed, the UP mode setting is also changed.*	**0: No** 1: Yes
	3	User Code Mode (Printer)	Selects whether the user code function is enabled in printer mode or not. *If this value is changed, the UP mode setting is also changed.*	**0: No** 1: Yes
5-501 *	1	PM Alarm Interval	Sets the PM interval, with an alarm. The Auto Service Call feature of the fax option also refers to this setting. *When the setting is "0", this function is disabled.*	0 ~ 255 1k copies/step **100 k copies**
	2	PM Alarm	Selects whether the PM alarm is enabled or not. If this is "0", the Auto Service Call feature of the fax option is also disabled.	0: No **1: Yes**
	3	PM Alarm (Original)	**Japanese version only.** **Do not change the value.**	
5-504*		PM Alarm (Jam Alarm)	**Japanese version only.** **Do not change the value.**	
5-507*	1	PM Alarm (Copy Size)	**Japanese version only.** **Do not change the value.**	
	2	PM Alarm (Staple)		
	3	PM Alarm (Toner End)		
5-508*	1	CE Call (Jam Level 1)	**Japanese version only.** **Do not change the value.**	
	2	CE Call (Jam Level 2)		
	3	CE Call (Door Open)		
5-801		Memory All Clear	Resets all software counters. Also, returns all modes and adjustments to the default settings. See the "MEMORY ALL CLEAR" section for how to use this SP mode correctly. ***Normally, this SP mode should not be used.*** *It is used only after replacing the NVRAM, or when the copier malfunctions due to a damaged NVRAM.*	

Service Tables

Mode No.			Function	Settings
Class 1 and 2	Class 3			
5-802		Free Run	Performs a free run for both the scanner and the printer. *To perform the free run, press 1 then press # twice. Press C/⊗ to stop.*	**0: No** 1: Yes
5-803		Input Check	Displays the signals received from sensors and switches. See the "INPUT CHECK" section for details. *Press ⊗/⊗ to exit the program.*	
5-804		Output Check	Turns on the electrical components individually for test purposes. See the "OUTPUT CHECK" section for details.	
5-808*	1	Display Language (115V machines)	Selects the display language for 115V machines.	**0: English** 1: French 2: Spanish
	2	Display Language (230V machines - Standard)	Selects the standard display language for 230V machines.	**0: English** 1: German 2: Dutch 3: French 4: Italian 5: Spanish
	3	Display Language (230V machines - Option)	Selects the option display language for 230V machines.	**0: English** 1: German 2: Dutch 3: Swedish 4: Norwegian 5: Danish
5-810		SC Code Reset	Resets any service call condition. After performing this SP mode, turn the machine main switch off and on. See "Troubleshooting - Service Call Conditions" for how to use this mode.	**0: No** 1: Yes
5-812 *		Service Telephone Number	Use this to input the telephone number of the service representative (this is displayed when a service call condition occurs). *Press the "•/#" key if you need to input a pause (—).* *Press the ⊗/⊗ key to delete the telephone number.*	
5-816*		CSS Function	**Japanese version only.** **Do not change the value.**	
5-817	1	CE Start Call	**Japanese version only.** **Do not change the value.**	
	2	CE Finish Call		

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
5-901		Printer Free Run	Performs the printer free run. *To perform the free run, press 1 then press # twice. Press C/⊘ to stop.*	**0: No** 1: Yes
5-902		Test Pattern Printouts	Prints the test pattern. *See the "TEST PATTERN PRINTING" section for how to print a test pattern.* *Change to the copy mode display by pressing the "Interrupt" key, then print out the test pattern.*	
5-903*		LCD Contrast Adjustment	Adjusts the contrast for the LCD on the operation panel. *Use the "Zoom" (+ or -) key to change the contrast.*	1 ~ 7 1/step **4**
5-904*		Auto Shut Off Mode Timer Setting	Inputs the auto off mode timer. *If "0" is selected, the auto timer function is disabled.*	0 ~ 120 1 min/step **30**
5-905*		CSS 25H Off Detection	**Japanese version only.** **Do not change the value.**	
5-906*		Fan Control Timer Setting	Inputs the fan control timer in the energy saver mode *This time is for entering the fan motor control mode after the fusing lamp off or the main motor turns off.*	30 ~ 120 1 s / step **30**
5-907		Brand Name and Production Name Setting	Selects the brand name and the production name for the Plug and Play function of Windows 95. The brand name and the production name for the Plug and Play function is registered in the NVRAM. If the NVRAM is defective, these names should be registered. *Press down the "Photo mode" key and the # key at the same time to register the setting.*	
5-911*		APS A4/LT Sideways Priority	Specifies whether the machine selects LT sideways paper if the original is A4. If "Yes" is selected, LT sideways is selected automatically when the APS sensors detect an A4 sideways original. This feature does not work in reverse (A4 sideways paper is not selected for an LT sideways original).	**0: No** 1: Yes
5-912	1	PCU Alarm Interval	Inputs the PCU alarm interval. *When the machine reaches the value, "Change Photoconductor Unit" will be displayed on the LCD to inform the user.*	**1 ~ 255** 1 k / Step **45 k**
	2	PCU Alarm Mode	Selects whether the PCU alarm function is performed or not.	0: No **1: Yes**

Service Tables

Mode No.			Function	Settings
Class 1 and 2	Class 3			
5-930*		Fax Forwarding Mode	Selects whether the fax mode application key is accepted or not in the SC condition. *When an SC condition occurs while incoming data has been stored in the SAF memory, change the value to "1" to access fax mode. Then forward the incoming data to another fax machine by using the fax mode bit switches.*	**0: No** 1: Yes
5-932		Program Download	Downloads the system program from a ROM board to the Flash Memory on the BICU board. (Copier mode softawre only) See "Service Tables - Program Download" for details. *This SP can be operated when the ROM board is installed in the machine.*	**0: No** 1: Yes
5-940*		Image Rotation Mode	Selects whether the image rotation function is performed or not. *If there is a problem with the MSU, image rotation may lead to abnormal copies. If so, disable image rotation while waiting for new parts.*	**0: Yes** 1: No
5-941*		Duplex Blank Page	Selects whether the blank page is made on the front side or back side when duplex copy mode is selected.	**0: Back side** 1: Front side
5-942*		Image Compression Method	Selects the image compression method for memory mode copying.	0: MH 1: MR **2: MMR**
5-943*		Charge Roller H.P Detection	Selects whether the charge roller home position is detected or not. ***Do not use in the field.***	**0: No** 1: Yes
5-944*		APS Mode	Selects whether the APS mode is selected as power-up default or not.	0: No **1: Yes**
5-945*		Memory Copy Priority	Selects whether or not the memory copy mode is selected when the main switch is turned on.	0: No **1: Yes**
5-991*		VRAM Data Download	**This SP mode is only used by the designer.** **Do not change the value.**	**0: Off** 1: On
5-992		System Parameter and Data List Printing	Prints the machine status history data list. See the "SYSTEM PARAMETER AND DATA LISTS" section for how to print the lists.	**0: No Print** 1: SP mode 2: UP mode 3: Log data

Mode No.			Function	Settings
Class 1 and 2	Class 3			
6-006 *	1	ADF Side-to Side Registration	Adjusts the printing side-to-side registration in the ADF mode. *Use the •/∗ key to toggle between + and -.*	-1.5 ~ +1.5 0.5 mm/step **+ 0.0 mm**
	2	ADF Leading Edge Registration	Adjusts the leading edge registration in the ADF mode. *Use the •/∗ key to toggle between + and -.*	-10 ~ +10 0.5 mm/step **+ 6.0 mm**
	3	ADF Trailing Erase Margin	Adjusts the trailing edge erase margin in ADF mode. *Use the •/∗ key to toggle between + and -.*	-3.0 ~ +3.0 0.1 mm/step **+ 0.0 mm**
6-007*		ADF Sub-scan Magnification	Adjusts the magnification in the sub-scan direction for ADF mode. *Use the •/∗ key to toggle between + and -. See "Replacement and Adjustment - Copy Image Adjustments" for details.*	- 4.0 ~ + 4.0 0.1 %/step **0.0 %**
6-009		ADF Free Run	Performs an ADF free run. *To perform the free run, press 1 then press # twice. Press C/⊘ to stop.*	**0: No** 1: Yes
6-010*		Stamp Position Adjustment	Adjusts the stamp position in the sub-scan direction in facsimile mode.	- 10 ~ + 10 1 mm/step **0 mm**
6-901		ADF Original Sensor Output Display	Displays the status of the original sensor for the ADF and paper size. *See "DF APS Original Sensor Output Display" after the SP mode table.*	
6-902*		ADF Original Scanning Method	Selects the original scanning method in ADF mode.	**0: Original** 1: Copy paper size + magnification
6-903*		Original Non-waiting Start	Selects whether the original non-waiting start is performed or not. *If the user often feeds originals that slip, and the leading edge is catching up with the trailing edge of the previous page, set this SP mode to No.*	0: No 1: Yes
6-904*		Original Scanning Interval	Adjusts the interval between originals in original non-waiting start mode. *This SP mode is only effective when SP 6-903 is set at "1".*	30 ~ 50 1 mm/step 40 mm
6-905*		ARDF Skew Correction	Selects whether the skew correction is done or not when the ARDF feeds the rear side of the original.	**0: Yes** 1: No
6-906*		ARDF Original Curl Adjustment	Adjusts the amount of original at the ARDF registration roller when the ARDF feeds the rear side of the original. *This SP mode is only effective when SP 6-905 is at "0."*	10 ~ 40 1 mm/step **15 mm**

Service Tables

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
6-910		ADF and Printer Free Run	Performs both an ADF and printer free run . *To perform the free run, press 1 then press # twice. Press C/⊘ to stop.*	**0: No** 1: Yes
7-001		Total Operation Time Display	Displays the total operation time (total drum rotation time).	
7-002*	1	Total Original Counter (Copy + Fax)	Displays the total number of scanned originals (copy + fax modes).	
	2	Total Original Counter (Copy	Displays the total number of scanned originals (copy mode only).	
	3	Total Original Counter (Fax)	Displays the total number of scanned originals (fax mode only).	
7-003*	1	Total Copy Counter (All Modes)	Displays the total number of copies (all modes).	
	2	Total Copy Counter (Copy mode)	Displays the total number of copies (copy mode only).	
	3	Total Copy Counter (Fax mode)	Displays the total number of copies (fax mode only).	
	4	Total Copy Counter (Printer mode)	Displays the total number of copies (printer mode only).	
7-004*		CE Counter Reset	**Japanese version only.** **Do not change the value.**	
7-101*	1	Total Copies by Paper Size (A3)	Displays the total number of copies by paper size.	
	2	Total Copies by Paper Size (B4)		
	3	Total Copies by Paper Size (A4)		
	4	Total Copies by Paper Size (B5)		
	5	Total Copies by Paper Size (11" X 17")		
	6	Total Copies by Paper Size (8 1/2" X 14")		

Mode No.			Function	Settings
Class 1 and 2	Class 3			
7-101*	7	Total Copies by Paper Size (8 1/2" X 11")	Displays the total number of copies by paper size.	
	8	Total Copies by Paper Size (8 1/2" X 5 1/2")		
	9	Total Copies by Paper Size (Other Size)		
7-201*		Total Number of Scanning	Displays the total number of scanned originals.	
7-204*	1	Total Paper Tray Counter (1st paper tray)	Displays the total number of copies fed from each paper feed tray.	
	2	Total Paper Tray Counter (2nd paper tray)		
	3	Total Paper Tray Counter (3rd paper tray)		
	4	Total Paper Tray Counter (4th paper tray)		
	5	Total Paper Tray Counter (By-pass feed)		
	6	Total Paper Tray Counter (Duplex tray)		
7-205*		ADF Total Counter	Displays the total number of originals fed by the ADF.	
7-301*	1	Total Copies by Reproduction Ratio (25% ~ 49%)	Displays the total number of copies by reproduction ratio.	
	2	Total Copies by Reproduction Ratio (50% ~ 99%)		

Mode No.			Function	Settings
Class 1 and 2	Class 3			
7-301*	3	Total Copies by Reproduction Ratio (Full size)	Displays the total number of copies by reproduction ratio.	
7-301*	4	Total Copies by Reproduction Ratio (101% ~ 200%)	Displays the total number of copies by magnified	
	5	Total Copies by Reproduction Ratio (201% ~ 400%)		
	6	Total Copies by Reproduction Ratio (Direct Mag.)		
	7	Total Copies by Reproduction Ratio (Direct Size Mag.)		
	8	Total Copies by Reproduction Ratio (Size Mag.)		
7-303*	1 ~ 23	Total Copies by Image Editing Mode	**Japanese version only.**	
	24	Total Copies by Image Editing Mode (Memory Sort)	Displays the total number of copies by image editing mode.	
	25	Total Copies by Image Editing Mode (Combine)		
	26	Total Copies by Image Editing Mode (Repeat Copy)		
	27	Total Copies by Image Editing Mode (Erase Copy)		

Mode No.			Function	Settings
Class 1 and 2	Class 3			
7-304*	1	Total Copies by Copy Mode (Overlay)	Displays the total number of copies by copy mode.	
	2	Total Copies by Copy Mode (Letter)		
	3	Total Copies by Copy Mode (Letter/Photo)		
	4	Total Copies by Copy Mode (Photo)		
	5	Total Copies by Copy Mode (Duplex)		
	6	Total Copies by Copy Mode (ADF)		
	7	Total Copies by Copy Mode (Double-copy)		
7-401*		Total SC Counter	Displays the total number of service calls that have occurred.	
7-501*		Total Jam Counter (Copies + Original)	Displays the total number of copy jams and original jams.	
7-502*		Total Copy Jam Counter	Displays the total number of copy jams.	
7-503*		Total Original Jam Counter	Displays the total number of original jams.	
7-504*	1	Total Jam by Location (A Jam)	Displays the total copy paper jam counter by location.	
	2	Total Jam by Location (B Jam)		
	3	Total Jam by Location (C Jam)		
	4	Total Jam by Location (Y Jam)		
	5	Total Jam by Location (E Jam)		

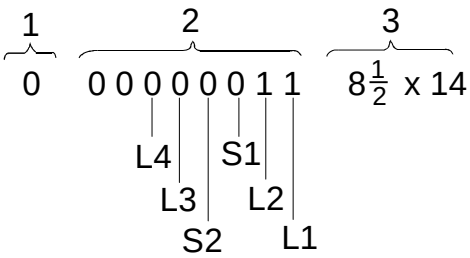
Service Tables

Mode No.			Function	Settings
Class 1 and 2	Class 3			
7-504*	6	Total Jam by Location (R Jam)	Displays the total copy paper jam counter by location.	
	7	Total Jam by Location (F Jam)		
	8	Total Jam by Location (1st Paper Tray)		
	9	Total Jam by Location (2nd Paper Tray)		
	10	Total Jam by Location (3rd Paper Tray)		
	11	Total Jam by Location (4th Paper Tray)		
	12	Total Jam by Location (By-pass Feed)		
	13	Total Jam by Location (Duplex Tray)		
7-801	1	ROM/CPU Version (IOCSS)	Displays the ROM version. **NOTE:** **Class 3 nos, 3, 7, and 8 are used only for the Japanese version.**	
	2	ROM/CPU Version (BiCU)		
	3	ROM/CPU Version (Edit)		
	4	ROM/CPU Version (Duplex)		
	5	ROM/CPU Version (Fax Control)		

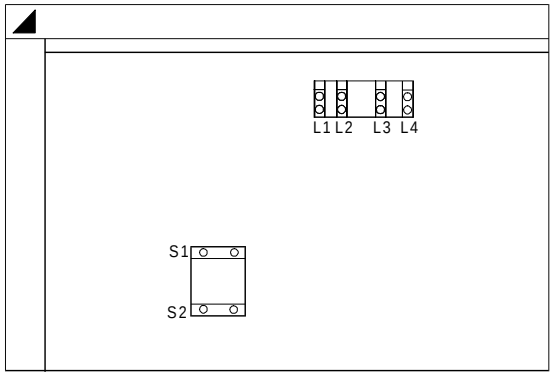
Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
7-801	6	ROM/CPU Version (Printer Control)	Displays the ROM version. **NOTE:** **Class 3 nos, 3, 7, and 8 are used only for the Japanese version.**	
	7	ROM/CPU Version (ANITA)		
	8	ROM/CPU Version (Scanner Control)		
	9	ROM/CPU Version (Stapler)		
7-803*		PM Counter Display	Displays the PM counter after the last PM.	
7-804		PM Counter Reset	Resets the PM counter. *Press down the "Photo mode" key and the # key at the same time to reset the counter.*	**0: No** 1: Yes
7-807		SC/Jam Counter Reset	Resets the SC and jam counters. *Press down the "Photo mode" key and the # key at the same time to reset the counter.*	**0: No** 1: Yes
7-808		Resets Counters (except for the total counter)	Resets the counters except for the following counters: 1. Total counter (SP7-003) 2. PCU counter (SP7-908) 3. Timer counter (SP7-991) *Press down the "Photo mode" key and the # key at the same time to reset the counter.*	**0: No** 1: Yes
7-810		User Code Number Reset	Resets the user code numbers. *Press down the "Photo mode" key and the # key at the same time to reset the counter.*	**0: No** 1: Yes
7-901*		SC History Display	Displays the SC codes that have occurred.	
7-902		SC History Clear	Clears the SC history. *Press down the "Photo mode" key and the # key at the same time to reset the data.*	**0: No** 1: Yes
7-903*		Copy Jam History Display	Displays the copy jams that have occurred.	

Mode No.			Function	Settings
Class 1 and 2	**Class 3**			
7-904		Copy Jam History Clear	Clears the copy jam history. *Press down the "Photo mode" key and the # key at the same time to reset the data.*	**0: No** 1: Yes
7-905*		Original Jam History Display	Displays the original jams that have occurred.	
7-906		Original Jam History Clear	Clears the original jam history. *Press down the "Photo mode" key and the # key at the same time to reset the data.*	**0: No** 1: Yes
7-907		Timer Counter Clear	Clears the timer counter. *Press down the "Photo mode" key and the # key at the same time to reset the counter.*	**0: No** 1: Yes
7-908		PCU Counter Display	Displays the number of copies that have been made using the current PCU.	
7-909		PCU Counter Clear	**Japanese version only** ***Do not use.***	
7-990		RAM Read	Displays the data in the RAM.	
7-991		Timer Counter Display	Displays the time since the last time that the main switch was turned on.	**0: No** 1: Yes

- APS and Platen/ADF Sensor Output Display (SP4-301) -



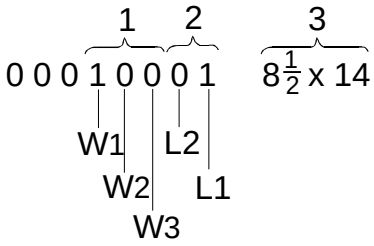
A193M502.wmf



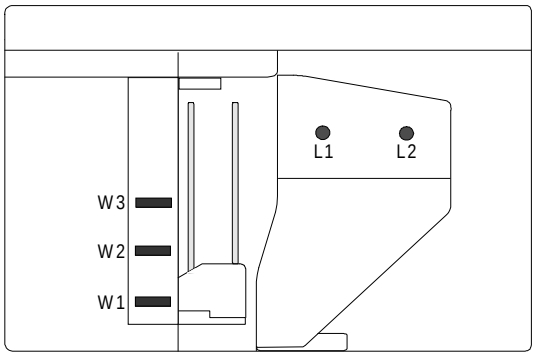
A193M504.wmf

1. Cover sensor status 1 = Closed
2. APS sensor status 1 = Paper detected
3. Paper size display

- DF APS Sensor Output Display (SP6-901) -



A193M503.wmf



A193M500.wmf

1. Original width sensor status 1 = Original detected
2. Original length sensor status 0 = Original detected
3. Paper size

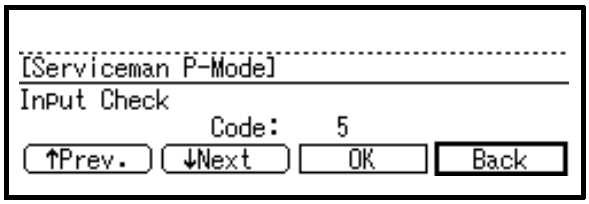
2.2.2 Test Pattern Printing (SP 5-902)

1. Access the SP mode which contains the test pattern you need.
2. Press the Interrupt key on the display to access the copy mode display.
3. Select the required copy features such as paper size, image density, and reproduction ratio.
4. Press the Start key on the operation panel.
5. After checking the test pattern, exit copy mode by pressing the Interrupt key on the operation panel.
6. Press the key three times to exit the SP mode.

Test Pattern Table for SP5-902

No.	Test Pattern	No.	Test Pattern
0	No Print	16	32 Grayscales (Horizontal)
1	Vertical Lines (single dot)	17	32 Grayscales (Vertical)
2	Horizontal Lines (single dot)	18	32 Grayscales (Vert./Hor.)
3	Vertical Lines (double dots)	19	32 Grayscales (V/H Overlay)
4	Horizontal Lines (double dots)	20	64 Grayscales (Horizontal)
5	Grid Pattern (single dot)	21	64 Grayscales (Vertical)
6	Grid Pattern (double dots)	22	64 Grayscales (Vert./Hor.)
7	Alternating Dot Pattern	23	64 Grayscales (V/H Overlay)
8	Full Dot Pattern	24	16 Grayscales (Horizontal)
9	Black Band	25	16 Grayscales (Vertical)
10	Trimming Area	26	16 Grayscales (Vert./Hor.)
11	Argyle Pattern	27	32 Grayscales (Horizontal)
12	16 Grayscales (Horizontal)	28	32 Grayscales (Vertical)
13	16 Grayscales (Vertical)	29	32 Grayscales (Vert./Hor.)
14	16 Grayscales (Vert./Hor.)	30	64 Grayscales (Horizontal)
15	16 Grayscales (Vert./Hor. Overlay)	31	64 Grayscales (Vertical)
		32	64 Grayscales (Vert./Hor.)

2.2.3 Input Check (SP5-803)



A193M507.wmf

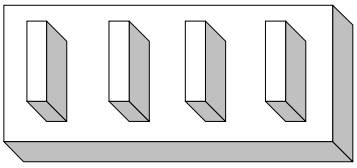
1. Access SP mode 5-803.
2. Select the number which will access the switch or sensor you wish to check (see the following table).
3. Check the status of the sensor or switch.
4. If you wish to check the signal during a copy cycle, select the required copy modes, then press the Start key. After that, re-enter the SP mode to check the next signal.
5. The reading ("0" or "1") will be displayed. The meaning of the display is as follows.

Number	Description	Reading	
		0	1
1	Front Door Safety Switch - +24V	Closed	Opened
2	Front Door Safety Switch - LD5V	Closed	Opened
3	Right Vertical Guide Switch	Closed	Opened
4	Left Vertical Door Sensor	Closed	Opened
5	Left Door Sensor	Closed	Opened
6	Fusing Exit Sensor	Paper not detected	Paper detected
7	Upper Exit Sensor	Paper not detected	Paper detected
8	Lower Exit Sensor	Paper not detected	Paper detected
9	Registration Sensor	Paper not detected	Paper detected
10	Upper Relay Sensor	Paper not detected	Paper detected
11	Charge Roller Contact Sensor	Not home position (Off)	At home position (On)
12	By-pass Feed Paper End Sensor	Paper not detected	Paper detected
13	Upper Tray Paper End Sensor	Paper not detected	Paper detected
14	Lower Tray Paper End Sensor	Paper not detected	Paper detected

Number	Description	Reading	
		0	1
15	Upper Paper Size Sensor	See Table 1	
16	Lower Paper Size Sensor	See Table 1	
17	Main Motor Lock	Not locked	Locked
18	Not used		
19			
20			
21			
22			
23	Upper Paper End Sensor (Optional Paper Tray Unit)	Paper not detected	Paper detected
24	Lower Paper End Sensor (Optional Paper Tray Unit)	Paper not detected	Paper detected
25	Upper Relay Sensor (Optional Paper Tray Unit)	Paper not detected	Paper detected
26	Lower Relay Sensor (Optional Paper Tray Unit)	Paper not detected	Paper detected
27	Upper Paper Size Sensor (Optional Paper Tray Unit)	See Table 1	
28	Lower Paper Size Sensor (Optional Paper Tray Unit)	See Table 1	
29	Tray Cover Switch (Optional Paper Tray Unit)	Closed	Opened
30	Paper Tray Unit Set (Optional Paper Tray Unit)	Not connected	Connected
31	Main Motor Lock (Optional Paper Tray Unit)	Not locked	Locked
32	Upper Tray Upper Limit Sensor (Optional Paper Tray Unit)	Paper not at high position	Paper at high position
33	Lower Tray Upper Limit Sensor (Optional Paper Tray Unit)	Paper not at high position	Paper at high position
34	Not used		
35			
36			
37	Duplex Entrance Sensor (Optional Duplex Unit)	Paper not detected	Paper detected
38	Inverter Unit Set (Optional Duplex Unit)	Not connected	Connected
39	Duplex Unit Set (Optional Duplex Unit)	Not connected	Connected
40	Not used		
41			
42			
43	1-bin Vertical Guide Door Switch (Optional 1-bin Sorter)	Closed	Opened
44	1-bin Sorter Unit Set (Optional 1-bin Sorter)	Not connected	Connected
45	Not used		
46	Not used		
47			
48	Feed Cover Open Sensor (Optional ADF)	Closed	Opened
49	Original Set Sensor (Optional ADF)	Paper not detected	Paper detected
50	DF Position Sensor (Optional ADF)	DF closed	DF opened

Number	Description	Reading	
		0	1
51	Registration Sensor (Optional ADF)	Paper not detected	Paper detected
52	ADF Set (Optional ADF)	Not connected	Connected
53	Not used		
54			
55			
56			
57			
58			
59			
60	Polygonal Mirror Motor Lock	Not locked	Locked
61	Not used		
62	Fusing Unit Set	Not connected	Connected
63	Main Switch	Off	On
64	BiCU Connection	Not connected	Connected
65	Not used		
66	Total Counter Connection	Not connected	Connected
67	Not used		
68	Key Counter Connection	Not connected	Connected
69	Not used		
70			

Table 1: Paper Size Data

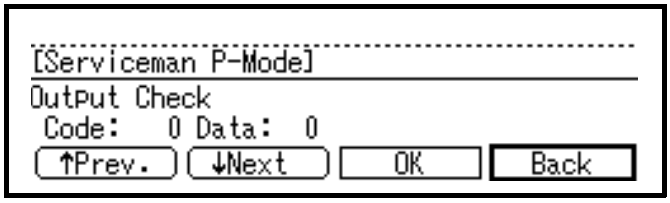


A193M501.wmf

Number	SW 1	SW 2	SW 3	SW 4	SP Value	Paper Size
15,16,27,28	0	0	0	0	0	---
	0	0	0	1	1	A3, F($8_{1/2}$"X13")
	0	0	1	1	3	A4 Sideways
	0	1	0	1	5	A4 Lengthwise
	0	1	1	1	7	A5 Sideways, 11"X17"
	1	0	1	1	11	B4, $8_{1/2}$"X14"
	1	1	0	0	12	* (Asterisk)
	1	1	0	1	13	B5 Sideways, 11"X$8_{1/2}$"
	1	1	1	1	15	B5 Lengthwise, $8_{1/2}$"X11"

1: Pushed

2.2.4 Output Check (SP5-804)



A193M508.wmf

CAUTION: To prevent mechanical or electrical damage, do not keep an electrical component on for a long time.

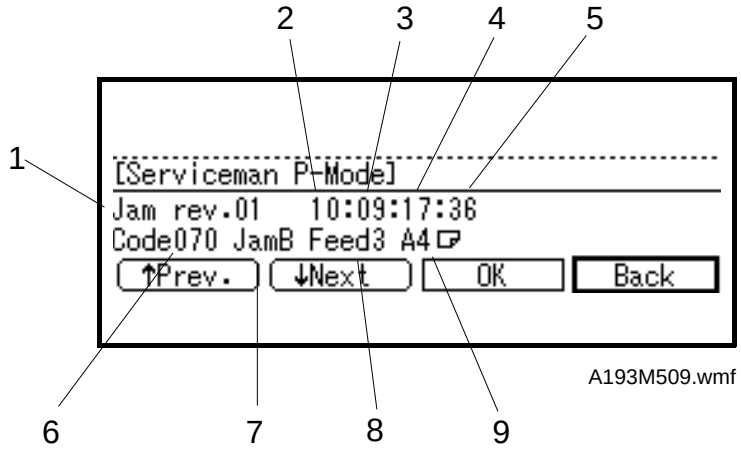
1. Access SP mode 5-804.
2. Select the SP number that corresponds to the component you wish to check (see the following table), then press #.
3. Press "1", then press # to check that component.
4. Exit the SP mode to interrupt the test.
5. If you wish to check another component, re-enter the SP mode.

- Output check table -

No.	Description	No.	Description
1	Junction Gate Solenoid	31	Not used
2	Registration Solenoid	32	
3	Upper Relay Clutch	33	1-bin Junction Gate Solenoid (Optional Sorter)
4	Lower Relay Clutch	34	1-bin Transport Motor (Optional Sorter)
5	Charge Roller Contact Clutch	35	Not used
6	By-pass Feed Clutch	36	
7	Upper Paper Feed Clutch	37	
8	Low Paper Feed Clutch	38	DF Feed Motor (Optional ADF)
9	Development Clutch	39	DF Feed Motor (Power Down) (Optional ADF)
10	Toner Bottle Drive Motor	40	DF Pick-up Solenoid (Optional ADF)
11	Main Motor (Forward)	41	Stamper Solenoid (Optional ADF)
12	Main Motor (Reverse)	42	DF Paper Feed Clutch (Optional ADF)
13	Exhaust Fan	43	Not used
14	Not used	44	
15		45	
16		46	
17		47	
18		48	
19	Upper Paper Feed Clutch (Optional Paper Tray Unit)	49	
20	Lower Paper Feed Clutch (Optional Paper Tray Unit)	50	
21	Upper Relay Clutch (Optional Paper Tray Unit)	51	
22	Lower Relay Clutch (Optional Paper Tray Unit)	52	
23	Main Motor (Optional Paper Tray Unit)	53	Polygonal Mirror Motor
24	Upper Paper Lift Motor (Up) (Optional Paper Tray Unit)	54	Not used
25	Lower Paper Lift Motor (Up) (Optional Paper Tray Unit)	55	
26	Upper Paper Lift Motor (Down) (Optional Paper Tray Unit)	56	
27	Lower Paper Lift Motor (Down) (Optional Paper Tray Unit)	57	
28	Not used	58	
29	Duplex Junction Gate Solenoid (Optional Duplex Unit)	59	
30	Not used	60	

2.2.5 Copy Jam History Display (SP7-903)

After entering the SP mode, select "1" and press the # key. The following message will be displayed.



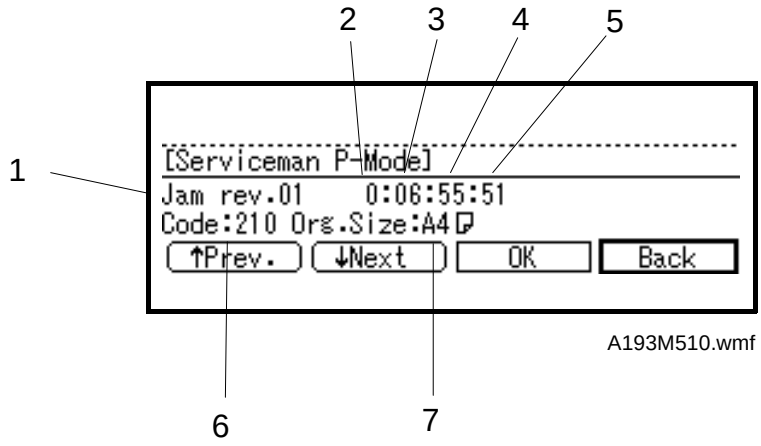
1: Jam history no. 2: Main motor operating date 3: Hour 4: Minute
5: Second 6: Jam code (see the table below) 7: Jam location
8: Paper feed station 9: Paper size

Jam Code	Meaning	Jam Code	Meaning
10	Registration sensor not activated (from paper tray).	120	Lower exit sensor not activated.
11	Relay sensor not activated.	121	Lower exit sensor remained activated by paper
30	Upper relay sensor (Optional PTU) not activated.	122	Upper exit sensor not activated.
31	Lower relay sensor (Optional PTU) not activated.	123	Upper exit sensor remained activated by paper
50	Registration sensor not activated (from by-pass feed)	124	Duplex exit sensor not activated.
70	Registration sensor remained activated by paper	125	Duplex exit sensor remained activated by paper
90	Fusing exit sensor not activated	150	Paper sensor (Optional 1-bin sorter) does not detect paper.
100	Duplex entrance sensor not activated		

NOTE: The NVRAM can store data for up to 10 copy jams. If more than 10 copy jams occur, the oldest data will be erased.

2.2.6 Original Jam History Display (SP7-905)

After entering the SP mode, select "1" and press the # key. The following message will be displayed.



1: Jam history no. 2: Main motor operating date 3: Hour 4: Minute
5: Second 6: Jam code (see the table below) 7: Original size

Jam Code	Meaning
210	Registration sensor not activated.
211	The registration sensor remained activated by paper.

NOTE: The NVRAM can store data for up to 10 original jams. If more than 10 original jams occur, the oldest data will be erased.

2.2.7 System Parameter And Data Lists (SP5-992)

1. Access SP mode 5-992 and select the number corresponding to the list that you wish to print.
2. Press the Interrupt key on the operation panel to access the copy mode display.
3. Select the paper size.
4. Press the Start key on the operation panel to print the list.
5. After printing the list, exit copy mode by pressing the Interrupt key on the operation panel.
6. Press the ⏻/Ⓘ key three times to exit the SP mode.

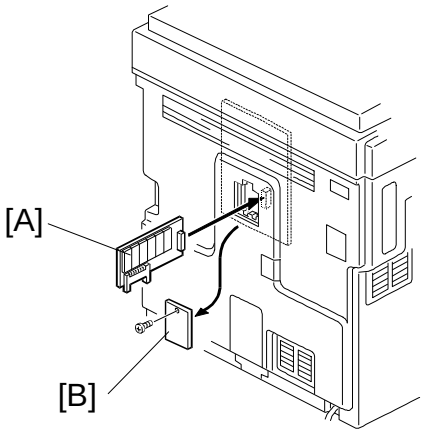
2.2.8 Memory All Clear (SP5-801)

CAUTION: Memory All Clear mode resets all the settings stored in the NVRAM to their default settings. Among these settings are the correction data for process control and all the software counters. Normally, this SP mode should not be used. This procedure is required only after replacing the RAM board or when the copier malfunctions due to a damaged RAM board.

1. Print out all System Parameter Lists (SP mode 5-992).
2. Enter SP mode 5-801.
3. Hold the "Photo Mode" key and # at the same time.
   (If the all memory clear was successful, the beeper will sound 5 times. If it failed, the beeper will sound only twice.)
4. Turn the main switch off and back on.
5. Do the printer and scanner registration and magnification adjustments (see section 11 of Replacement and Adjustment).
6. Referring to the system parameter list, re-enter any values which had been changed from their factory settings. In particular, the values for SP4-904, SP4-905, SP4-906, and SP4-907 must be re-entered.
7. Do the standard white level adjustment (SP 4-908). See Replacement and Adjustment - White Level Adjustment for details.
8. Check the copy quality and the paper path, and do any necessary adjustments.

2.2.9 Program Download

This procedure copies the software from an ROM board to the Flash ROM on the BICU board.



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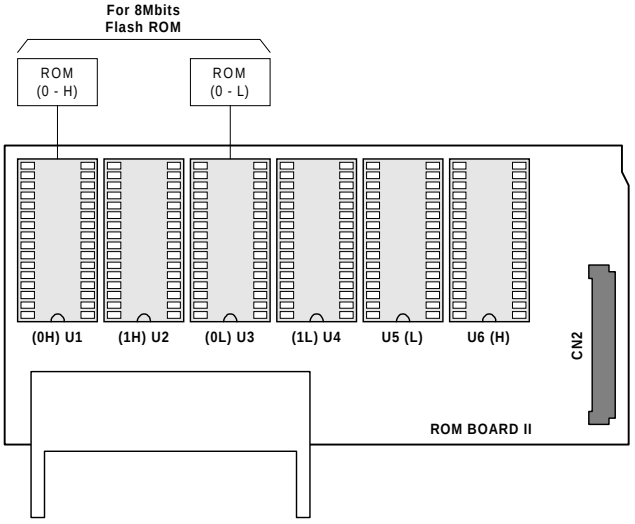


A193M513.wmf

1. Turn off the main and ac switches.
2. When the new software is downloaded from an ROM board [A], mount the ROMs on the correct ROM sockets as shown above.
3. Remove the ROM cover [B].
4. Plug the ROM board into the connector on the BICU board.
5. Turn on the ac and main switches, access SP5-932, select YES, and press the # key.
6. After completing the download, turn off the ac and main switches, then remove the ROM board.

Service Tables

3. USER PROGRAM MODE

The user program (UP) mode is accessed by users and key operators, and by sales and service staff. UP mode is used to input the copier's default settings.

3.1 HOW TO ENTER AND EXIT UP MODE

Press the User Tools button, then select the UP mode program. After selecting the UP mode program, press the User Tools button to exit UP mode.

UP Mode Table (System Settings)

System	**1. Function Priority**	
	2. Clear Function Setting	
	3. Panel Beeper	
	4. Copy Count Display	
	5. Auto Reset	1. System Auto Reset
		2. Copy Reset
		3. Fax Reset
		4. Printer Reset
	6. Function Timeout	
	7. Auto Energy Saver	
	8. Energy Save Mode	
	9. Auto Shut Off	
	10. Special Paper Size	
	11. Paper Tray Priority	
	12. Auto Tray Switch	
	13. By-pass Auto Select	
	14. Output Tray	1. Copier
		2. Fax
		3. Printer
	15. Simultaneous Print	
	16. Contrast	
	17. Set User Codes	1. Copy User Codes
		2. Fax User Codes
		3. Printer User Codes
	18. Restricted Access	1. Reset Counters
		2. Register User Codes
		3. Change/Delete User Codes
		4. Key Operator Code
		5. Register/Change Key Operator Code
		6. Copier Access
		7. Fax Access
		8. Printer Access

UP Mode Table (Copy Settings)

Copy	**1. General Features**	1. APS Priority
		2. AID Priority
		3. Original Priority
		4. Show All Keys
		5. Maximum Copy Q'ty
		6. Original Beeper
		7. Photo Mode
	2. Adjust Image	1. Erase Border
		2. Erase Center
		3. Left Duplex Margin
		4. Top Duplex Margin
		5. Double Copy Separation Line
		6. Combine/Image Repeat Separation Line
	4. Input/Output	1. Duplex Auto Eject
		2. Combine Auto Eject
		3. Original Count
		4. SADF Auto Reset
		5. ADF Auto Sort
		6. Rotate Sort
		7. Rotate Sort Auto Paper Continue

4. SWITCHES/LEDS

4.1 SWITCHES

BICU

Number	Function
SW 1	Resets all systems (like turning the main switch off/on).

4.2 LEDS

BICU

Number	Function
LED 1	Monitors the +5V line for the slave CPU (IC5). Usually, this LED is blinking.
LED 2	Monitors the +5V line. Usually, this LED is lit.

IOCSS

Number	Function
D103	Monitors the connection between the IOCSS and the BICU. Usually, this LED is lit.

4.3 TEST PIN

IOCSS

Number	Monitored Signal
TP105	Monitors the control voltage of the TD sensor (Vcont).

5. SPECIAL TOOLS AND LUBRICANTS

5.1 SPECIAL TOOLS

Part Number	Description	Q'ty
A006 9104	Scanner Positioning Pin (4 pcs/set)	1
A193 9351	ROM Board 2	1
A193 9535	Flash ROM/SRAM Copy Tool 2	1
A153 9004	Wiping Cloth (for the Drum Charge Roller)	1
5420 9516	Test Chart - OS-A3 (10 pcs/set)	1
5420 9507	Digital Multimeter	1

SECTION 5

PREVENTIVE MAINTENANCE

1. PREVENTIVE MAINTENANCE SCHEDULE

1.1 PM TABLE

NOTE: The amounts mentioned as the PM interval indicate the number of prints.

Symbol key: C: Clean, R: Replace, L: Lubricate, I: Inspect

A193	EM	100K	200K	300K	NOTE
SCANNER/OPTICS					
Reflector		C	C	C	Optics cloth
1st Mirror		C	C	C	Optics cloth
2nd Mirror		C	C	C	Optics cloth
3rd Mirror		C	C	C	Optics cloth
Scanner Guide Rails		C	C	C	Do not use alcohol.
Platen Sheet Cover	C	I	I	I	Replace the platen sheet, if necessary. Dry cloth or alcohol
Exposure Glass		C	C	C	Dry cloth or alcohol
Toner Shield Glass		C	C	C	Optics cloth
APS Sensor		C	C	C	Dry cloth or alcohol
AROUND THE DRUM					
Transfer Roller		R	R	R	To clean, use a blower brush.
Quenching Lamp		C	C	C	Dry cloth
PAPER FEED					
Registration Roller		C	C	C	Clean with water or alcohol.
Paper Feed Roller (By-pass feed table)	C	C	C	C	Clean with water or alcohol.
Registration Mylar		C	C	C	Clean with water or alcohol.
Relay Rollers		I	I	I	Clean/replace if necessary
Paper Feed Guides		C	C	C	Clean with water or alcohol.
Paper Feed Rollers		R	R	R	
Bottom Plate Pad		C	C	C	Clean with water or alcohol.
Bottom Plate Pad (By-pass feed)		C	C	C	Clean with water or alcohol.
FUSING UNIT					
Fusing Entrance and Exit Guide Plates		C	C	C	Clean with water or alcohol.
Hot Roller		R	R	R	
Pressure Roller		R	R	R	
Fusing Thermistor		I	I	I	Clean if necessary
Cleaning Roller		C	C	C	Clean with water or alcohol.
Cleaning Roller Bushings		C	C	C	Alcohol
Hot Roller Strippers		R	R	R	
Hot Roller Bushing		R	R	R	

A193	EM	100K	200K	300K	NOTE
OTHERS					
Drive Belts		I	I	I	Replace if necessary

	EM	60K	120K	185K	240K	NOTE
AUTO DOCUMENT FEEDER		(for originals)				
Transport Belt	C	R	R	R	R	Alcohol
Separation Roller	C	R	R	R	R	Alcohol
Pick-up Roller	C	R	R	R	R	Alcohol
Stamper	I					Replace if necessary
White Plate	C					Alcohol
DF Exposure Glass	C					Alcohol
Platen Cover	C					Alcohol

PAPER TRAY UNIT	EM	100K	200K	300K	400K	NOTE
Paper Feed Rollers			R		R	
Relay Rollers			C		C	Dry or damp cloth
Relay Driven Rollers			C		C	Dry or damp cloth
Bottom Plate Pads			C		C	Dry or damp cloth
Relay Clutches			I		I	Replace if necessary
Paper Feed Clutches			I		I	Replace if necessary

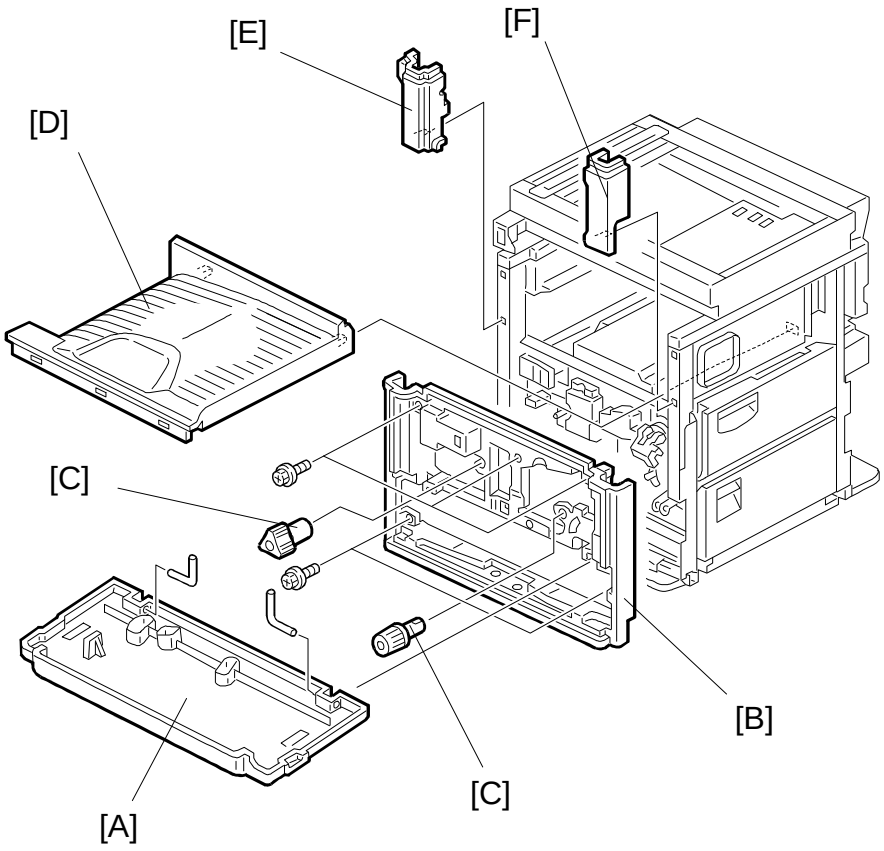
DUPLEX TRAY	EM		NOTE
Paper Feed Roller	C		Damp cloth
Transport Rollers	C		Damp cloth
Inverter Rollers	C		Damp cloth

SECTION 6

REPLACEMENT AND ADJUSTMENT

1. EXTERIOR

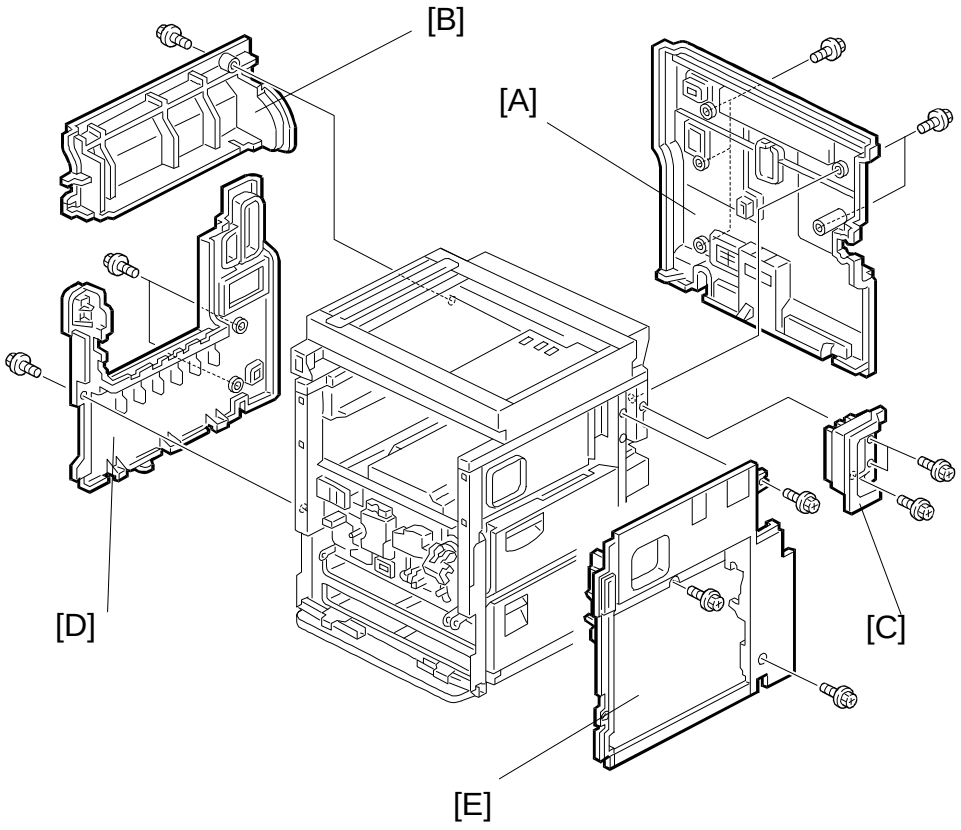
1.1 FRONT COVER/INNER COVER



A193R001.wmf

1. Open the front cover [A].
2. Remove the front cover (2 pins).
3. Remove the inner cover [B] (2 knobs [C], 6 screws and 1 screw if the optional paper tray unit is installed).
4. Remove the copy tray [D].
5. Remove the front left cover [E] and front right cover [F].

1.2 REAR COVER



A193R002.wmf

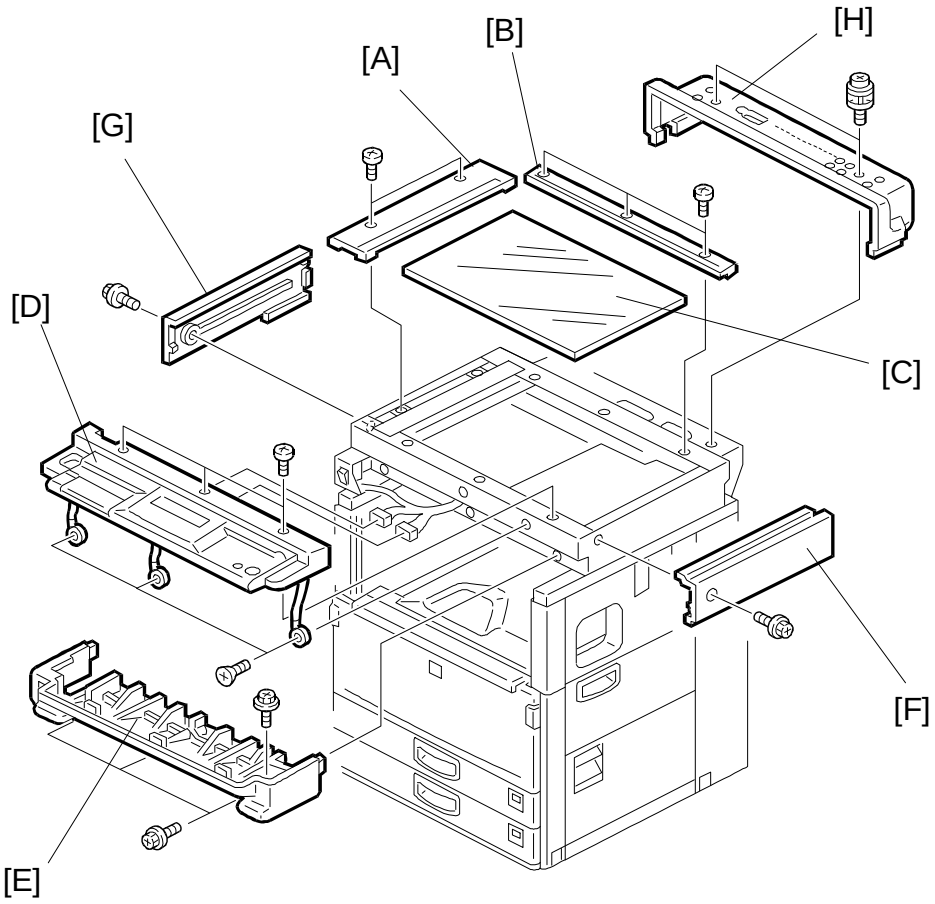
CAUTION: If the machine is equipped with a DF and a paper tray unit, disconnect the cable which connects the copier with the DF and the paper tray unit, before removing the rear cover.

1. Remove the rear cover [A] (6 screws).
2. Remove the upper left cover [B] (1 screw) and the upper right cover [C] (3 screws).

1.3 LEFT/RIGHT COVER

1. Remove the front cover, inner cover, rear cover, upper left cover, and upper right cover.
2. Remove the left cover [D] (4 screws) and right cover [E] (3 screws).

1.4 EXPOSURE GLASS/OPERATION PANEL/UPPER COVER



A193R003.wmf

1. Remove the left scale [A] and rear scale [B] (5 screws).
2. Remove the exposure glass [C].
3. Remove the operation panel [D] (6 screws).

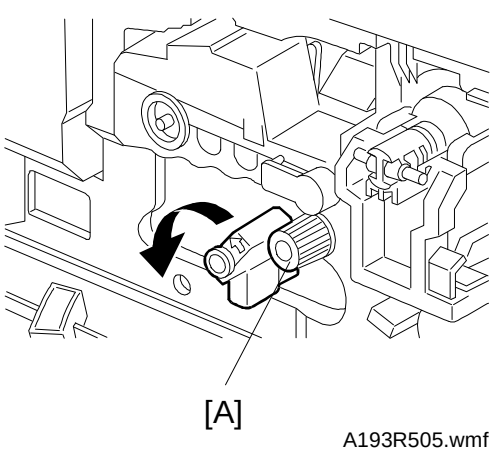
   NOTE: When reinstalling the operation panel, connect the grounding terminal [E] so that the wire is vertical.
4. Remove the operation lower cover [F] (4 screws).
5. Remove the scanner right cover [G] (1 screw).
6. Remove the scanner left cover [H] (1 screw).
7. Remove the scanner rear cover [I].

2. PHOTOCONDUCTOR UNIT (PCU)

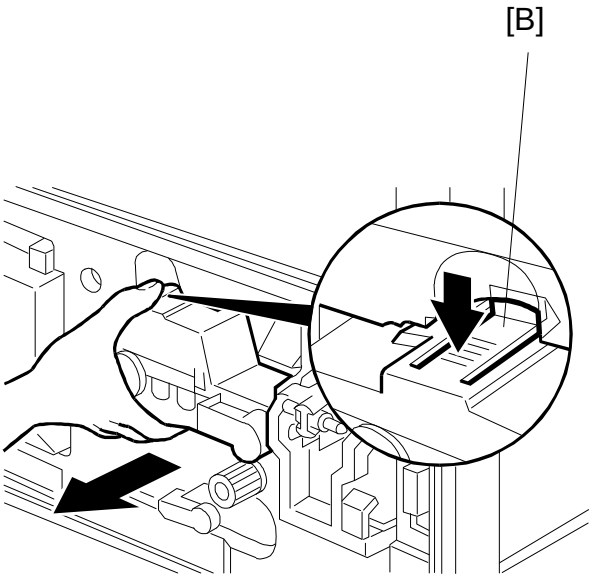
⚠ WARNING

Do not incinerate the photoconductor unit. Toner dust might ignite when exposed to an open flame. Dispose of the used photoconductor unit in accordance with local regulations for plastics.

2.1 PCU



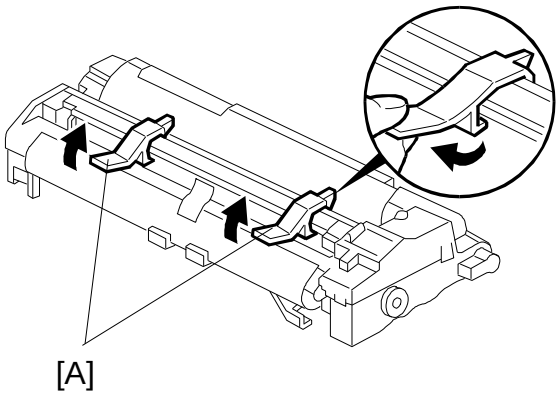
A193R505.wmf



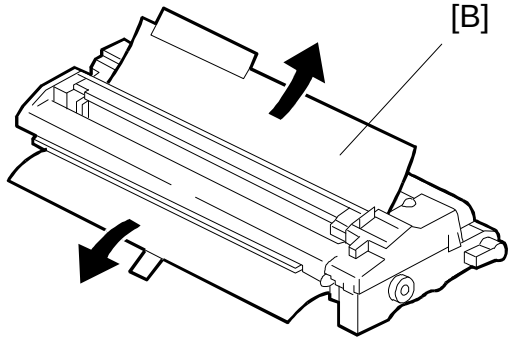
A193R506.wmf

1. Turn the lever [A] to the left to release the transfer unit. Then, pull the PCU out slightly, while pushing the release lever [B] to unlock the PCU.
2. Pull the PCU out until it stops.
3. Hold the PCU with both hands. Slightly tilt the PCU to the left and right to unlock it. Then, pull the PCU out.

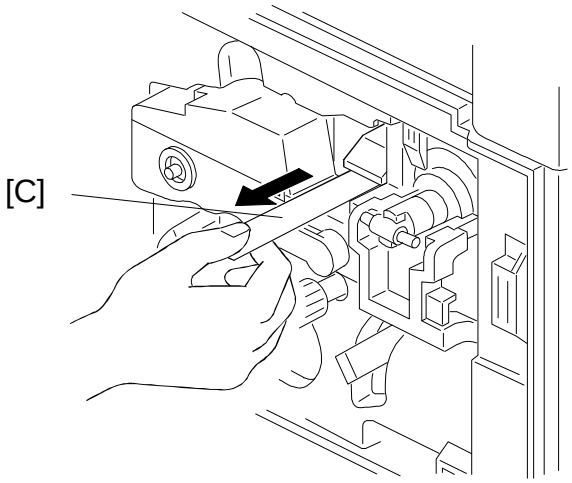
   NOTE: Do not tilt the used PCU after removing it from the machine, to prevent toner spillage.



A193R508.wmf



A193R509.wmf



A193I502.wmf

4. Remove the 2 clamps [A] and the drum protection sheet [B] from the new PCU.

   NOTE: Do not touch the photoconductor. If you do, copy quality may be abnormal.

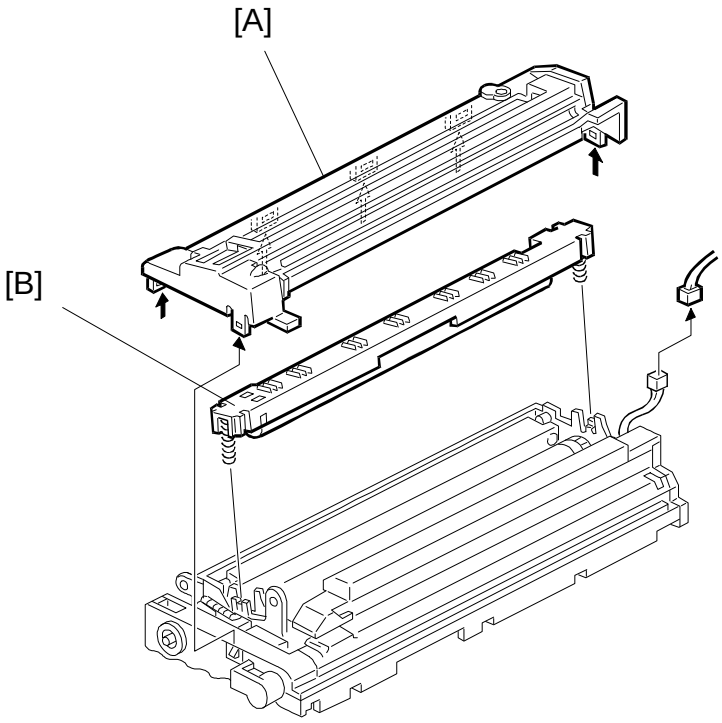
5. Insert the new PCU into the machine. Push the new PCU until the release lever locks.

6. Peel the sealing tape [C] off gently.

7. Return the lever to its original position (see lever [A] on the previous page).

   NOTE: After replacing the PCU, the machine will take about 2 minutes to warm up. During this warm-up period, do not open the front cover or turn off the ac and main switches or a fault may occur.

2.2 DRUM CHARGE ROLLER UNIT

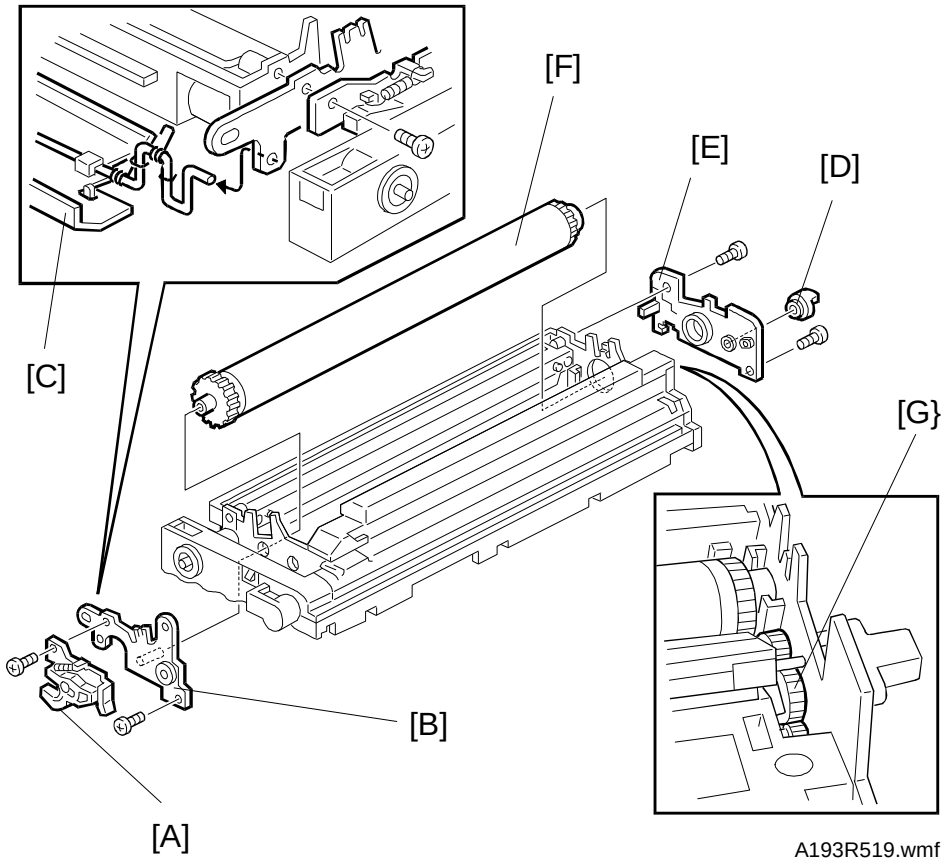


A193R525.wmf

1. Remove the upper cover [A] of the PCU (6 hooks).
2. Remove the drum charge roller unit [B].

NOTE: 1. Do not let the springs fall. Do not remove the drum charge roller from the case when cleaning or replacing.
2. Never touch the surface of the drum charge roller.
3. If there is any dirt on the surface of the drum charge roller, wipe it off with a dry cloth or a special cloth for the drum charge roller. (The special cloth is available as a service part: A1539004.) **Never use alcohol or water to clean the drum charge roller.**

2.3 DRUM



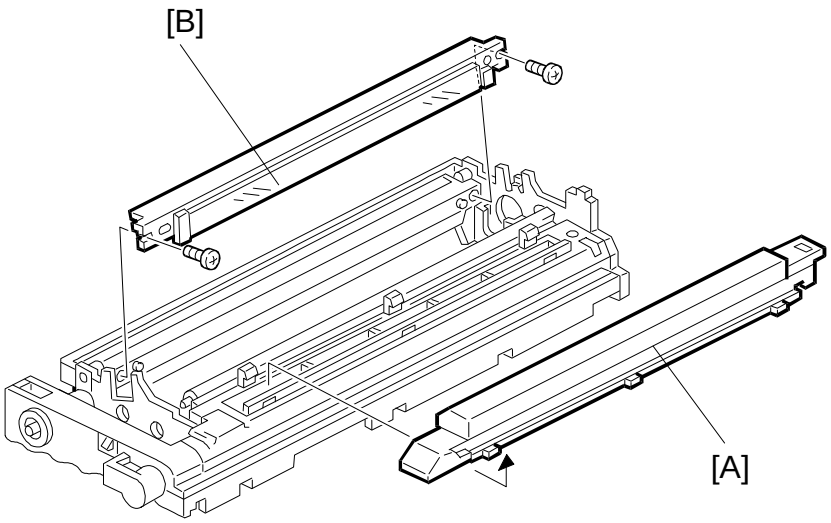
A193R519.wmf

1. Remove the drum charge roller unit. (See Drum Charge Roller Unit.)
2. Remove the shutter cam [A] (1 screw) and the front plate [B] (1 screw).
3. Remove the shutter [C].
4. Remove the joint [D] and rear plate [E] (2 screws).
5. Remove the drum [F].

NOTE: Do not touch the drum surface with bare hands.

CAUTION: Be careful not to spill toner over the train of gears [G] when removing the front or rear plate. Otherwise, development roller torque is likely to increase.

2.4 CLEANING BLADE

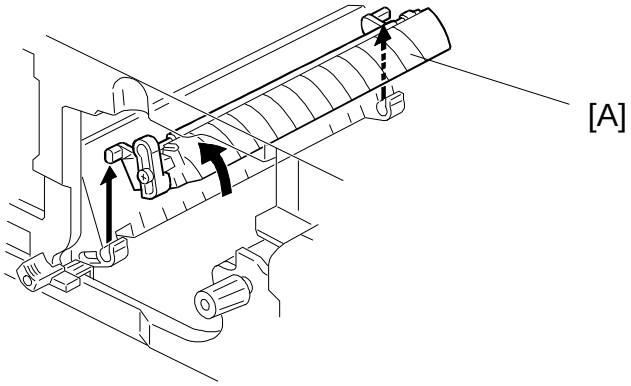


A193R008.wmf

1. Remove the drum. (See Drum.)
2. Remove the developer cartridge [A] (3 hooks).
3. Remove the cleaning blade [B] (2 screws).

3. TRANSFER UNIT

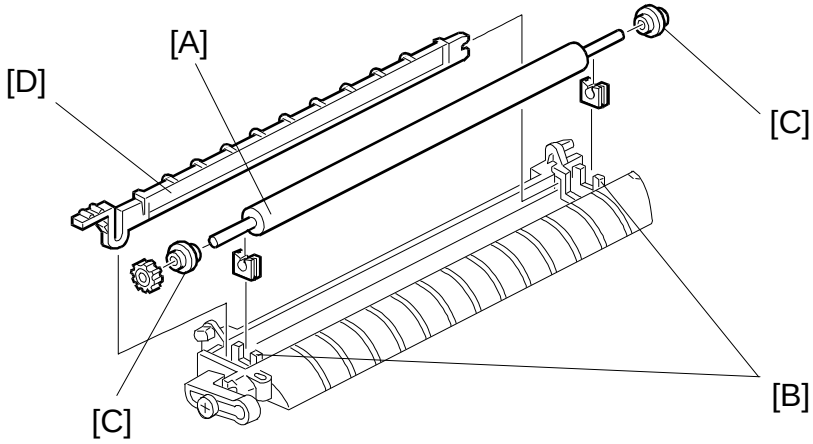
3.1 TRANSFER UNIT



A193R009.wmf

1. Remove the PCU.
2. Raise the transfer unit [A] vertically and remove it.

3.2 TRANSFER ROLLER/SEPARATION UNIT



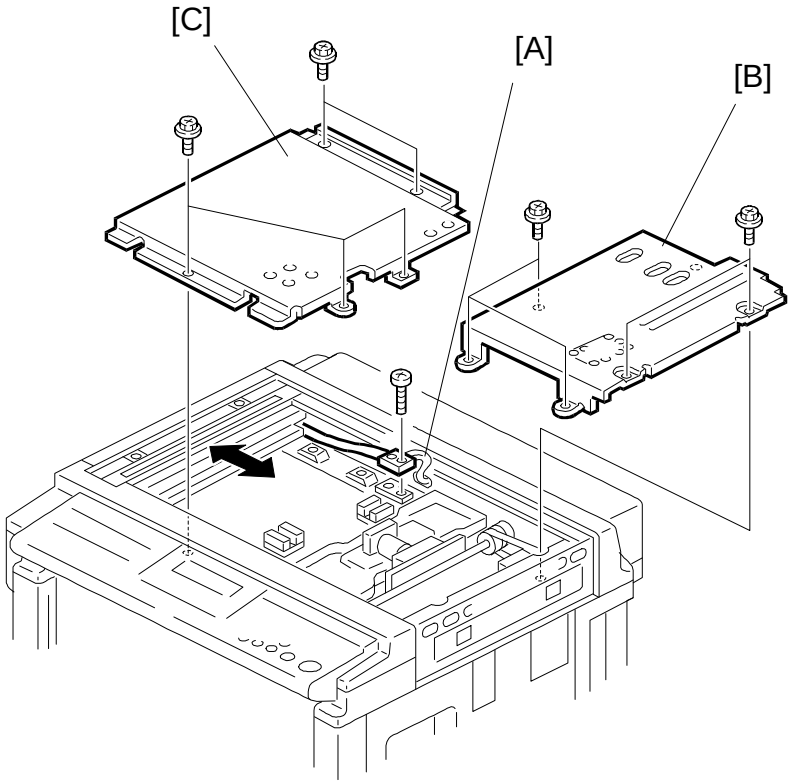
A193R010.wmf

1. Remove the transfer unit. (See Transfer Unit.)
2. Remove the transfer roller [A].

   NOTE: 1) Clean the bushings [B] and pulleys [C]. When replacing the transfer roller, replace the bushings and pulleys together.
   2) Do not touch the surface of the transfer roller with bare hands. When cleaning the transfer roller, use a blower brush, not a cloth.
3. Remove the discharge brush [D].

4. SCANNER UNIT

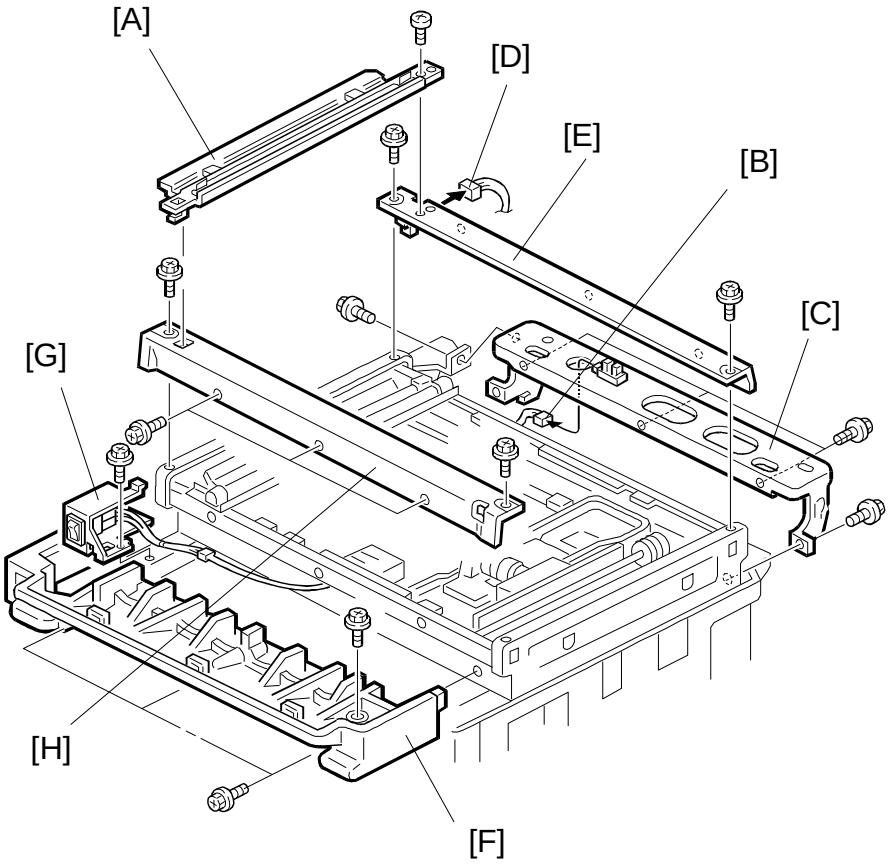
4.1 LENS COVER



A193R011.wmf

1. Remove the scales and exposure glass. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the flat cable [A] (1 screw).
3. Remove the right lens cover [B] (5 screws) and left lens cover [C] (5 screws).

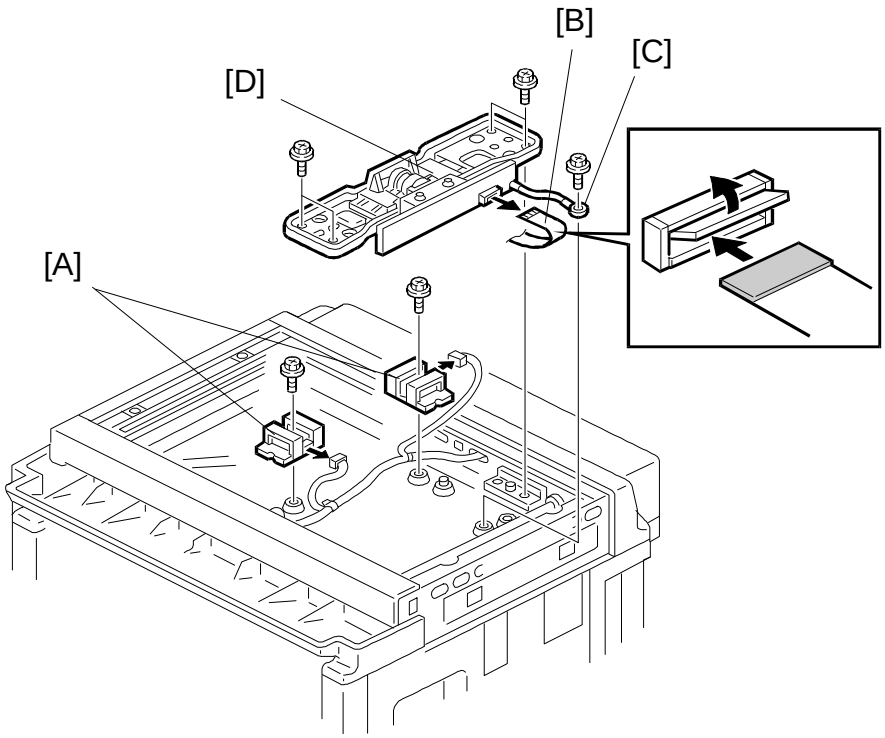
4.2 SCANNER FRAME



A193R523.wmf

1. Remove the platen cover (ADF).
2. Remove all parts indicated in the Exposure Glass/Operation Panel/Upper Cover section.
3. Remove the exposure glass bracket [A] (1 screw).
4. Disconnect the platen cover sensor [B] and remove the lower rear scanner frame [C] (6 screws).
5. Disconnect the scanner H.P. sensor [D] and remove the upper rear scanner frame [E] (2 screws).
6. Remove the lower operation panel [F] (3 screws).
7. Remove the main switch bracket [G] (1 screw).
8. Remove the front scanner frame [H] (5 screws).

4.3 ORIGINAL SIZE SENSOR



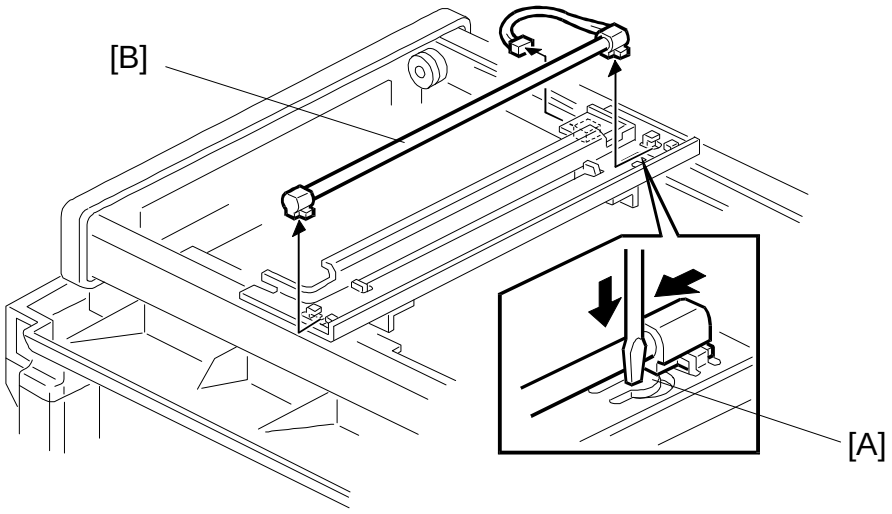
A193R013.wmf

1. Remove the exposure glass. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the lens covers. (See Lens Cover.)
3. Change the original size sensors [A]: two for 115 V machines and three for 230 V machines (2 screws each).

4.4 LENS BLOCK/SBU ASSEMBLY

1. Remove the exposure glass and operation panel. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the lens covers. (See Lens Cover.)
3. Disconnect the flexible harness [B].
4. Remove the grounding wire [C].
5. Remove the lens block [D] (4 screws).
6. Do the scanner and printer copy adjustments in section 11.

4.5 XENON LAMP

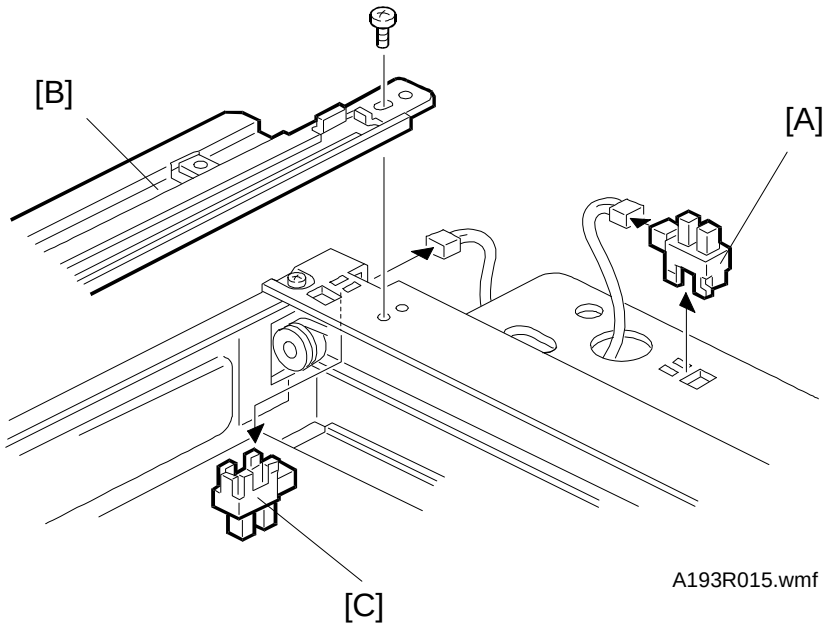


A193R014.wmf

1. Remove the exposure glass and operation panel. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the scanner frames. (See Scanner Frame.)
3. Press the lamp holder [A] down with a driver, as shown.
4. Slide the xenon lamp [B] forward and remove it (1 connector).

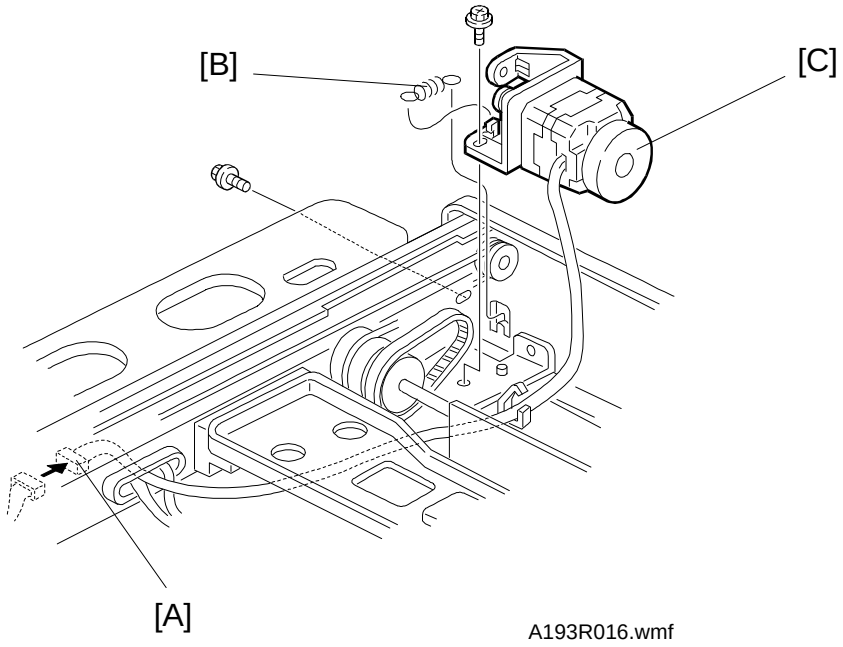
   NOTE: Do not touch the glass surface of the xenon lamp with fingers.
5. After placing the new lamp, press the lamp holder up to the original position so that it could hold the lamp properly.

4.6 SCANNER H. P. SENSOR/PLATEN COVER SENSOR



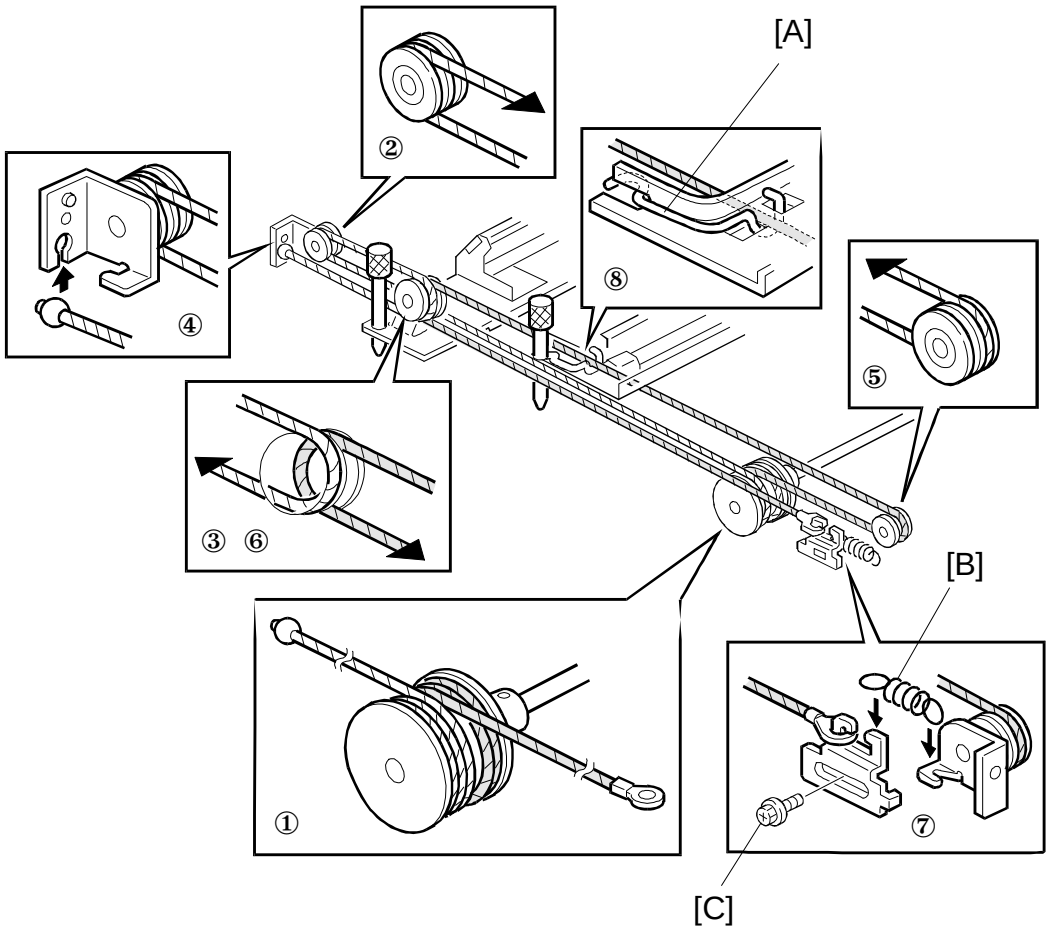
1. Remove the exposure glass and upper rear cover. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Replace the platen cover sensor [A] (1 connector).
3. Remove the scale bracket [B] (1 screw) and replace the scanner H.P. sensor [C].

4.7 SCANNER MOTOR



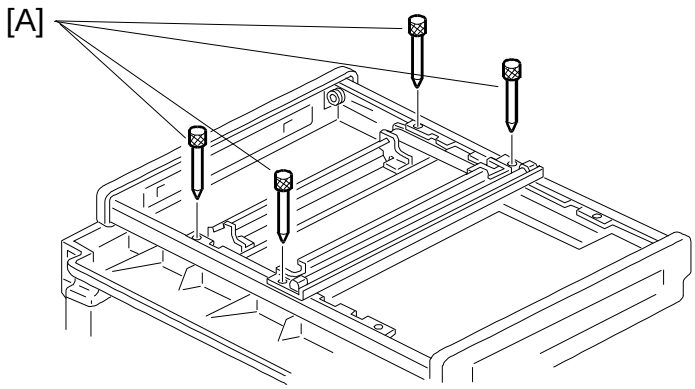
1. Remove the exposure glass and operation panel. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the lens covers. (See Lens Cover.)
3. Remove the scanner frames. (See Scanner Frame.)
4. Remove the harness [A].
5. Remove the tension spring [B].
6. Remove the motor bracket [C] (2 screws).
7. Secure the new motor with the tension spring.
8. Do the scanner and printer copy adjustments in section 11.

4.8 SCANNER WIRE



A193R520.wmf

1. Remove the exposure glass and operation panel. (See Exposure Glass/Operation Panel/Upper Cover.)
2. Remove the lens covers. (See Lens Cover.)
3. Remove the scanner frames. (See Scanner Frame.)
4. Remove the pin [A] securing the 1st scanner and remove the 1st scanner.
5. Remove the spring [B].
6. Loosen the screw [C] securing the wire tension bracket. Loosen the screw at the opposite side.
7. Remove the scanner wire.
8. Wind the new scanner wire on the pulley in the correct direction as shown.



A193R018.wmf

9. Wind the end of the new wire with a ball as shown in illustrations ② - ④ on the previous page.
10. Wind the end of the new wire with a ring as shown in illustrations ⑤ - ⑦ on the previous page.
11. Secure the screw of the wire tension bracket, with the wire tension spring pulled as shown in illustration ⑦ on the previous page.
12. Install the 1st scanner and adjust its position with the scanner positioning tools (P/N A0069104) [A]. Then clamp the 1st scanner with the scanner positioning pin as shown in illustration ⑧ on the previous page.
13. Remove the positioning tools. After sliding the scanner to the left and right several times, set the scanner positioning tools to check the clamp position and wire tension bracket position again.
14. Do the scanner and printer copy adjustments in section 11.

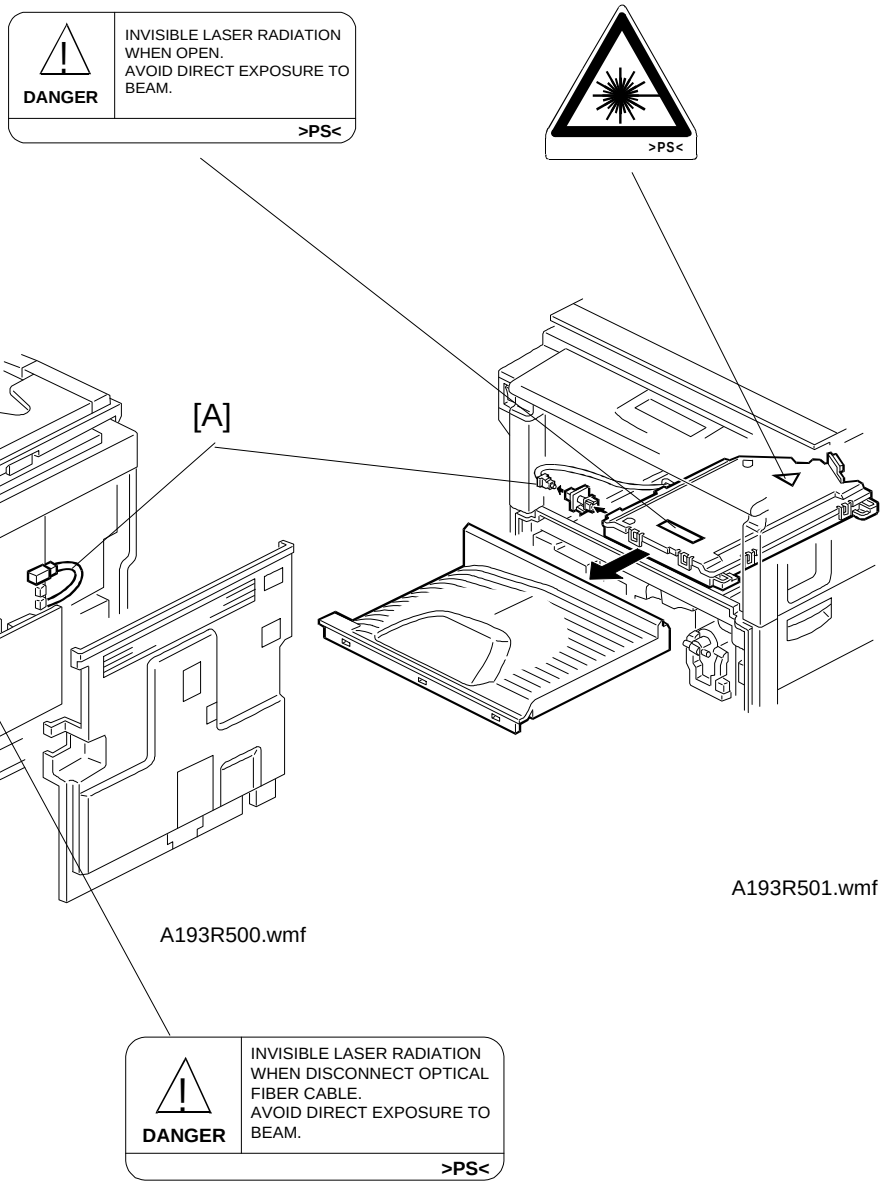
5. LASER UNIT

⚠ WARNING

Turn off the main switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

- CAUTION DECALS -

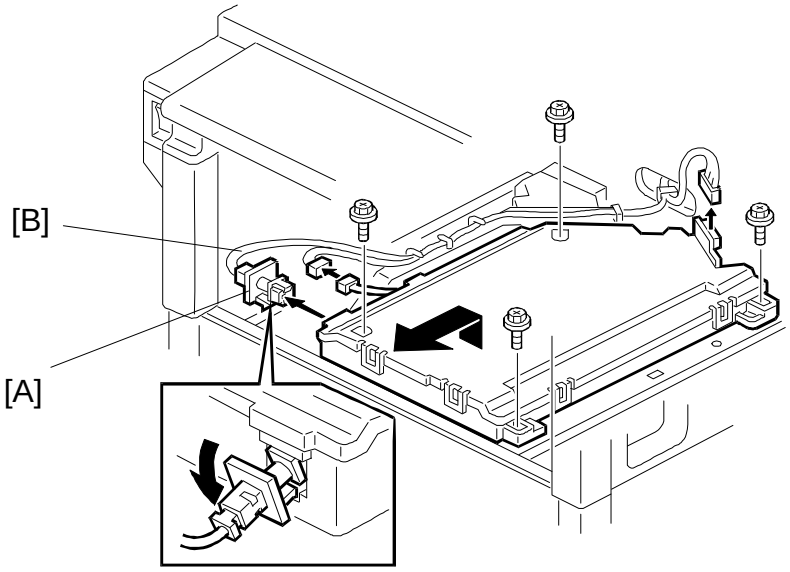
Three caution decals and the optical fiber cable [A] are located in the laser section as shown below.



A193R501.wmf

A193R500.wmf

5.1 LASER UNIT/MAIN SCAN SYNCHRONIZATION DETECTOR



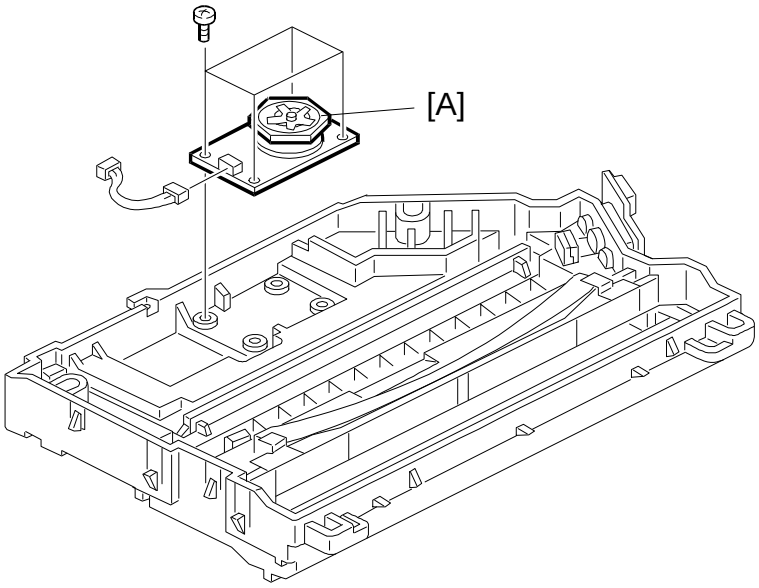
A193R504.wmf

⚠ WARNING

Turn off the main switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

1. Remove the copy tray.
2. Remove the main scan synchronizing detector [A].
3. Disconnect the optical fiber cable [B].
4. Remove the laser unit (4 screws and 1 connector).

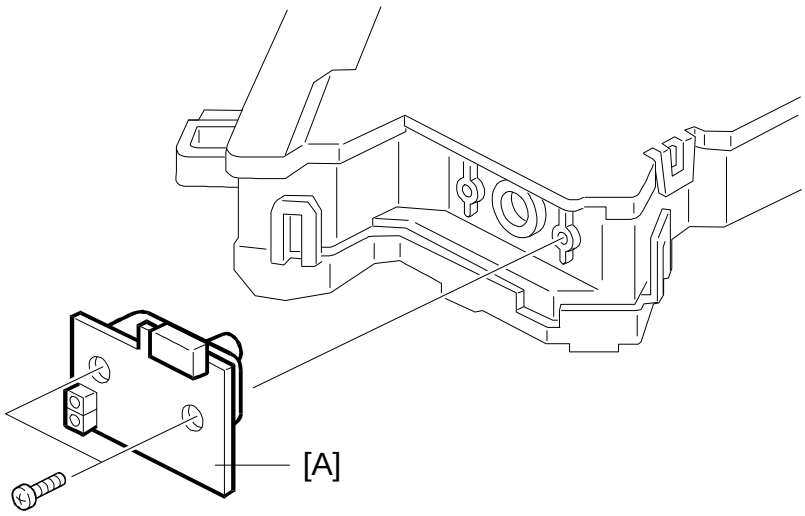
5.2 POLYGON MIRROR MOTOR



A193R502.wmf

1. Remove the front cover, inner cover, copy tray, and the front left and right covers (see section 1.1)
2. Remove the copy tray.
3. Remove the main scan synchronizing detector.
4. Remove the laser unit (4 screws, 2 connectors).
5. Remove the laser unit cover.
6. Remove the polygon mirror motor [A] (4 screws, 1 connector).
7. Do the scanner and printer copy adjustments in section 11.

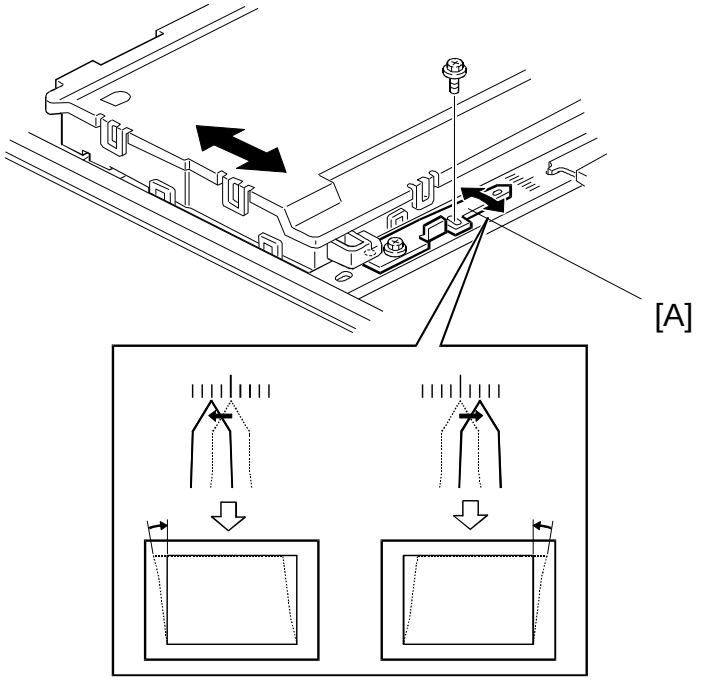
5.3 LD UNIT



A193R503.wmf

1. Remove the copy tray.
2. Remove the main scan synchronizing detector.
3. Remove the laser unit (4 screws, 2 connectors).
4. Remove the LD unit [A] (2 screws).

5.4 LASER UNIT POSITIONING ADJUSTMENT



⚠ CAUTION

Do not open the laser unit cover during the adjustment.

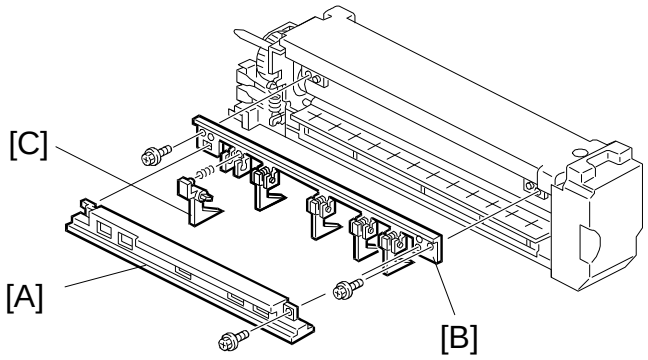
1. Print the trimming pattern on A3 paper and estimate the amount of skew on the printed parallelogram.
2. Loosen the screws securing the laser unit (4 screws).
3. Loosen the screws securing the adjustment lever [A] (2 screws).
4. Move the adjustment lever to the proper position on the scale.

   NOTE: When the adjustment lever is shifted by one unit on the scale, the image skews by 0.2 mm.
5. Secure the adjustment lever (2 screws).
6. Secure the laser unit (4 screws).
7. Check the copy image.

6. FUSING/EXIT

⚠ CAUTION
The fusing unit gets hot. Do not touch the metal part with bare hands.

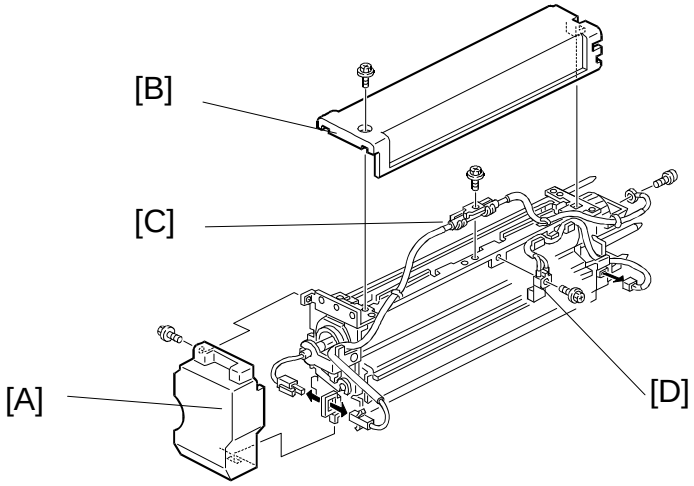
6.1 HOT ROLLER STRIPPERS



A193R023.wmf

1. Pull out the fusing unit (1 screw).
2. Remove the exit guide plate [A] (1 screw).
3. Remove the hot roller stripper bracket [B] (2 screws).
4. Replace the hot roller strippers [C] .

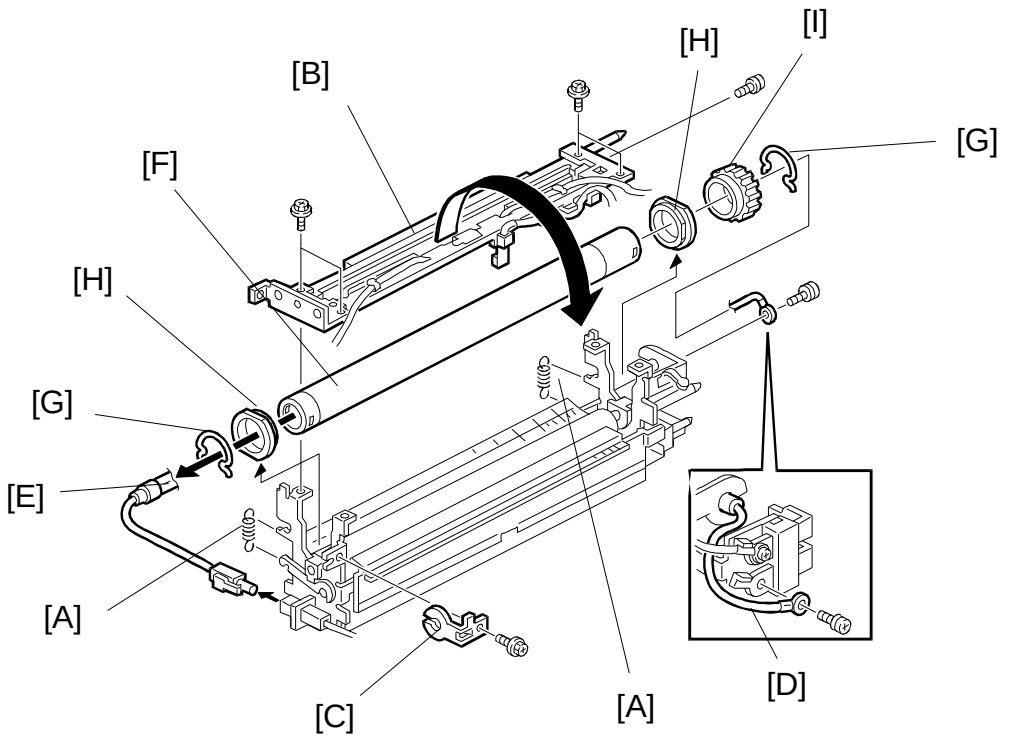
6.2 FUSING THERMISTOR/THERMOFUSE



A193R024.wmf

1. Pull out the fusing unit (1 screw).
2. Remove the front cover [A] (1 screw) and the upper cover [B] (1 screw).
3. Remove the fusing thermofuse [C] (2 screws, 1 connector).
4. Remove the fusing thermistor [D] (1 screw, 1 connector).

6.3 HOT ROLLER/FUSING LAMP



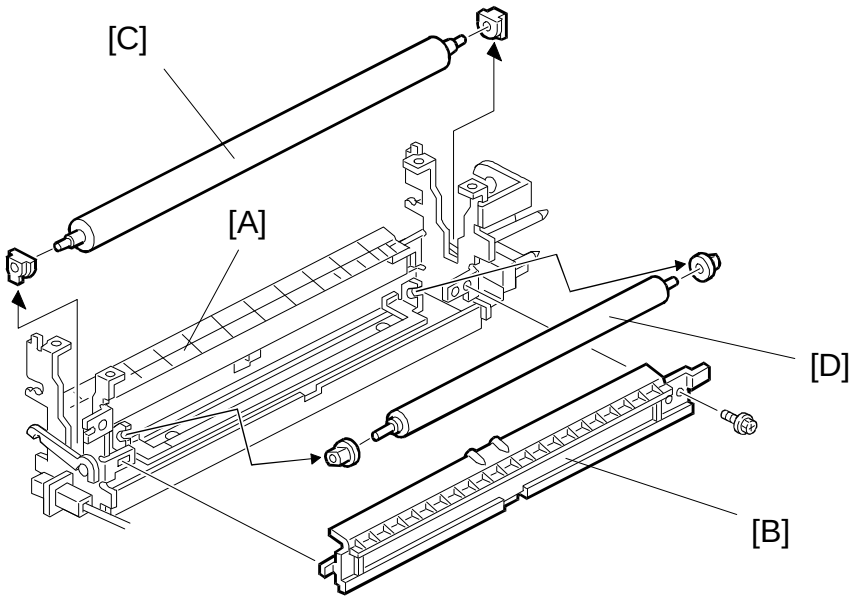
A193R025.wmf

1. Pull out the fusing unit (1 screw).
2. Remove the front cover and upper cover. (See Fusing Thermister/Thermofuse.)
3. Remove the front and rear pressure springs [A] after checking their positions. (The standard positon is in the middle.)
4. Remove the fusing stay [B] (5 screws).
5. Remove the front lamp holder [C] (1 screw).
6. Remove the fusing harness [D] (1 screw and 1 connector), pull the fusing lamp [E] out forward, and keep it in a safe place.
7. Remove the hot roller [F].

   NOTE: Do not touch the hot roller with bare hands.
8. Remove the front and rear C-rings [G], then remove the hot roller bushings [H] and fusing gear [I].

   NOTE: Do not touch the fusing lamp with bare hands.

6.4 PRESSURE ROLLER/CLEANING ROLLER

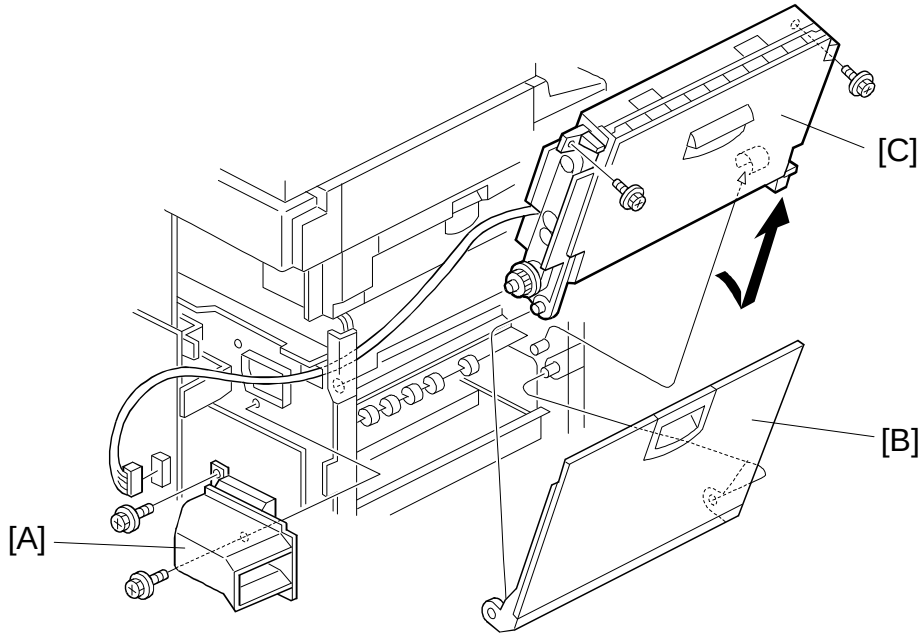


A193R026.wmf

1. Remove the hot roller. (See Hot Roller/Fusing Lamp.)
2. Remove the exit guide plate [A] (1 screw).
3. Check the height position of the entrance guide plate [B] (the upper position is standard) and remove it (1 screw).
4. Remove the pressure roller [C].
5. Remove the cleaning roller [D].

7. EXIT

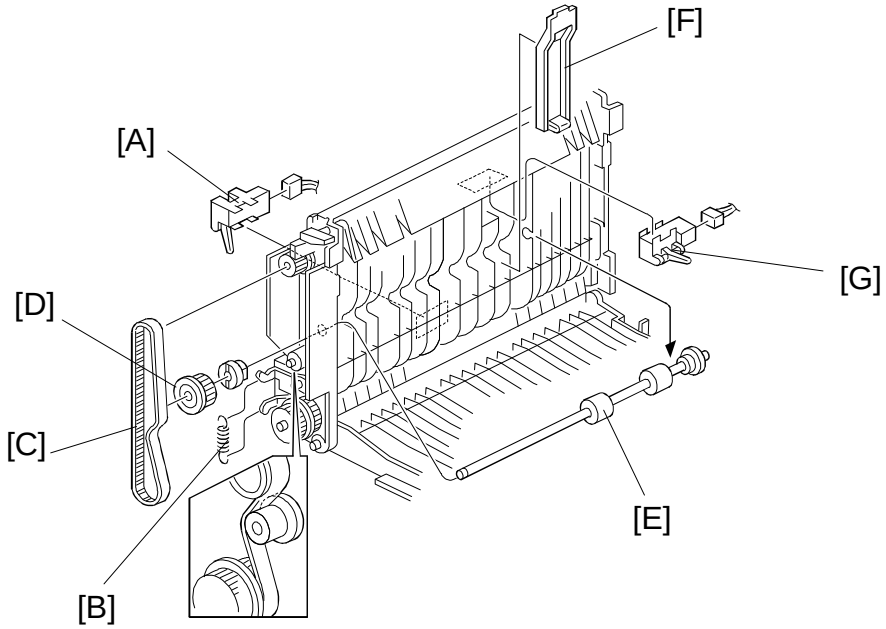
7.1 EXIT UNIT



A193R528.wmf

1. Remove the left cover, front left cover, and rear cover. (See Rear Cover Removal and Left/Right Cover.)
2. Remove the duct [A] (2 screws).
3. Remove the face up tray [B] and the exit unit [C] (2 screws and 1 connector)

7.2 UPPER EXIT SENSOR/LOWER EXIT SENSOR

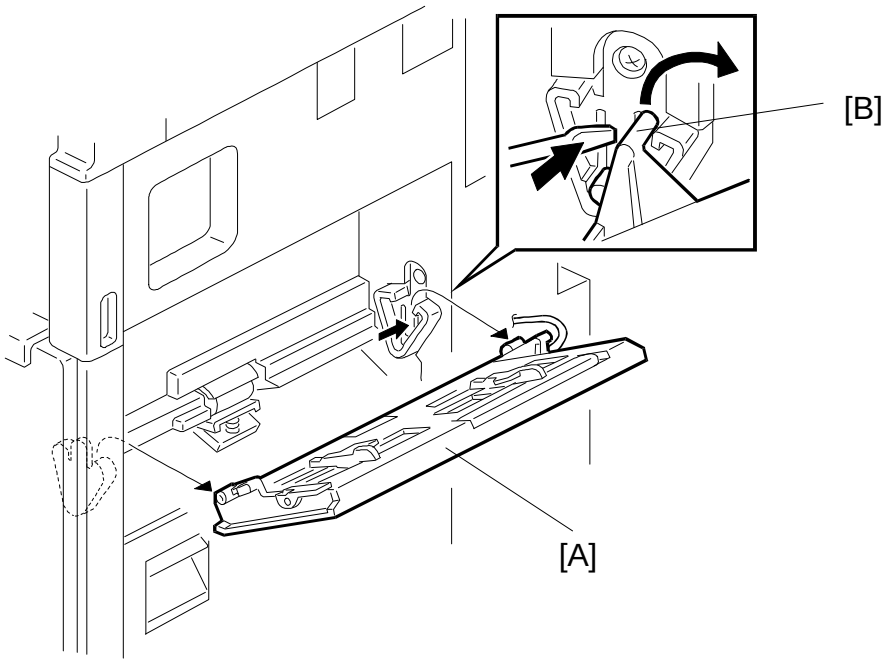


A193R529.wmf

1. Remove the exit unit. (See Exit Unit.)
2. Replace the lower exit sensor [A] (1 connector).
3. Remove the spring [B].
4. Remove the timing belt [C].
5. Remove the pulley [D].
6. Remove the transport roller [E] (2 busing).
7. Remove the harness cover [F].
8. Replace the upper exit sensor [G] (1 connector).

8. PAPER FEED/ REGISTRATION

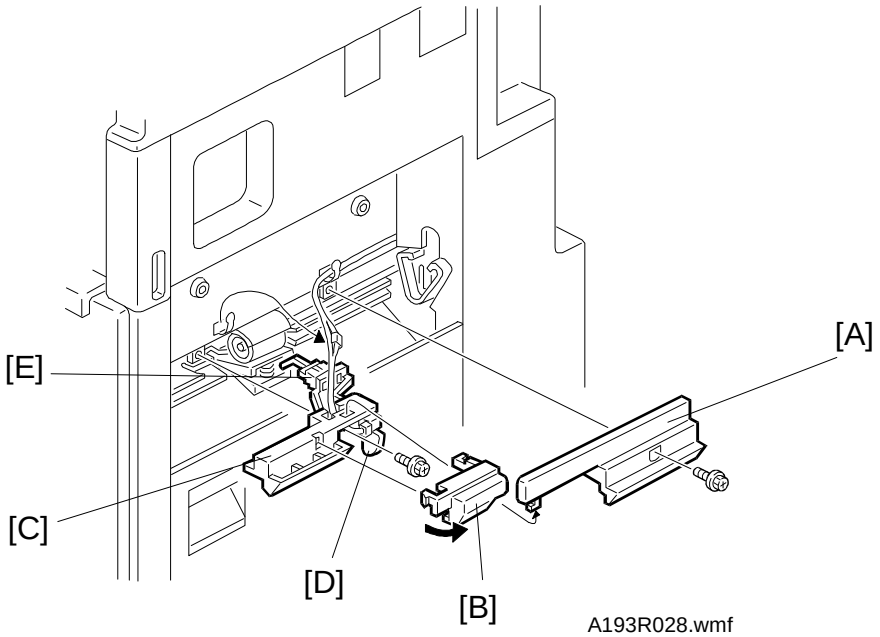
8.1 BY-PASS FEED TRAY



A193R027.wmf

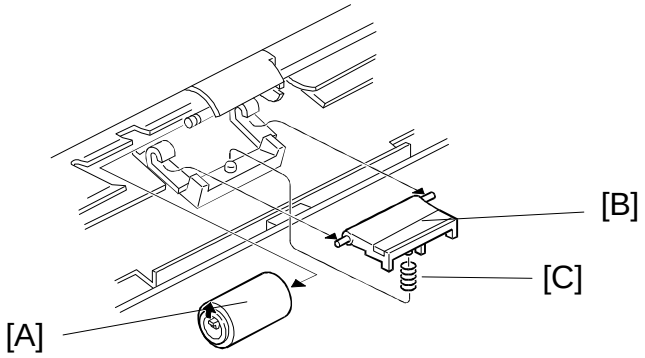
1. Remove the by-pass feed tray [A], holding the hook [B] on the by-pass feed tray with a tool, such as a screwdriver.
2. Disconnect the harness from the IOCSS board.

8.2 BY-PASS FEED PAPER END SENSOR/REGISTRATION SENSOR



1. Remove the by-pass feed tray. (See By-pass Feed Tray.)
2. Remove the paper feed roller cover [A] (1 screw).
3. Remove the cap [B].
4. Remove the sensor holder [C] (1 sensor).
5. Remove the by-pass feed paper end sensor [D] (1 screw).
6. Remove the registration sensor [E] .

8.3 PAPER FEED ROLLER/FRICTION PAD

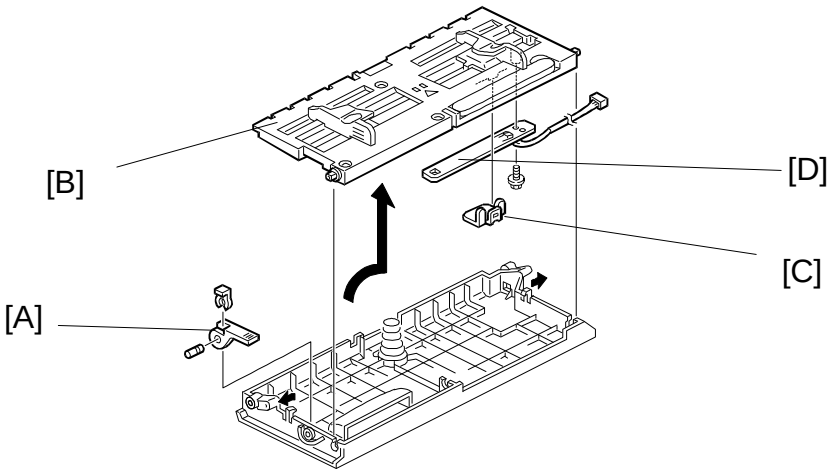


A193R029.wmf

1. Remove the registration sensor and paper end sensor unit. (See By-pass Feed Paper End Sensor/Registration Sensor.)
2. Remove the paper feed roller [A] (1 hook).
3. Remove the friction pad [B].

   NOTE: Do not lose the spring [C].

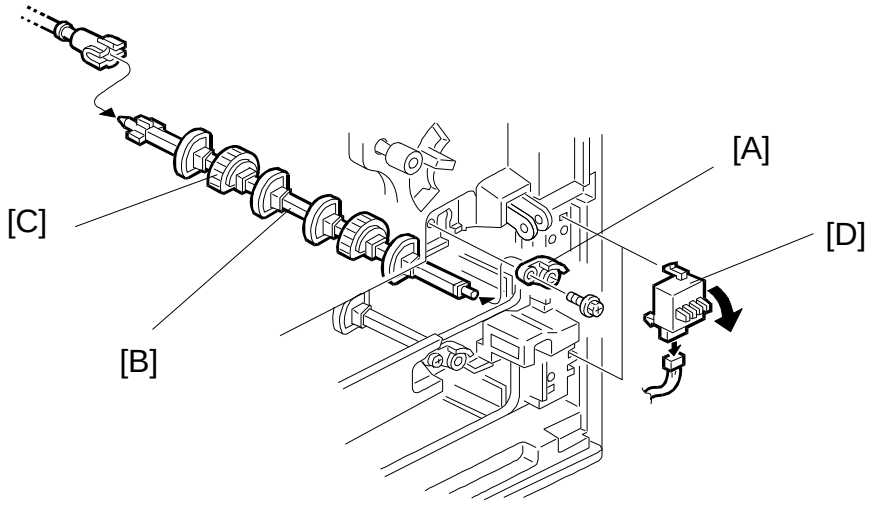
8.4 BY-PASS FEED PAPER WIDTH SENSOR



A193R030.wmf

1. Remove the by-pass feed table assembly (see By-pass Feed Tray).
2. Remove the table lever [A] (1 snap ring and 1 pin).
3. Remove the by-pass feed table [B] (2 hooks).
4. Remove the width sensor spring plate [C].
5. Remove the by-pass feed paper width sensor [D] (1 screw).

8.5 PAPER FEED ROLLERS/PAPER SIZE DETECTOR



A193R031.wmf

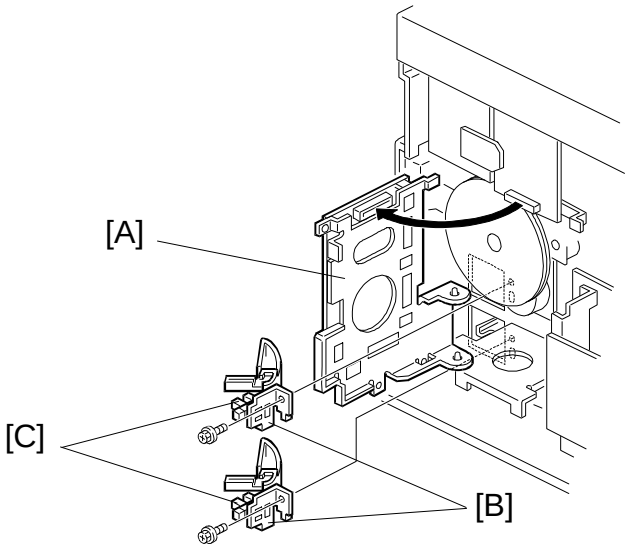
8.5.1 Paper Feed Rollers

1. Remove the paper tray.
2. Remove the front door only when replacing the 1st paper feed roller.
3. Remove the paper feed bushing [A] (1 screw).
4. Pull the paper feed roller shaft [B] out.
5. Replace the paper feed roller [C].

8.5.2 Paper Size Detector

1. Remove the paper tray.
2. Remove the paper size detector [D] (1 connector), while holding it down.

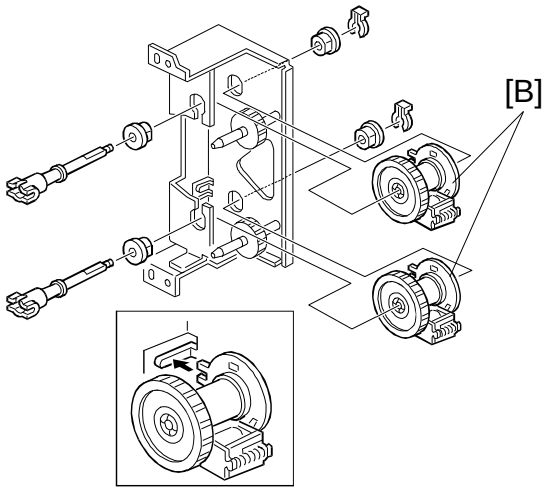
8.6 PAPER END SENSORS



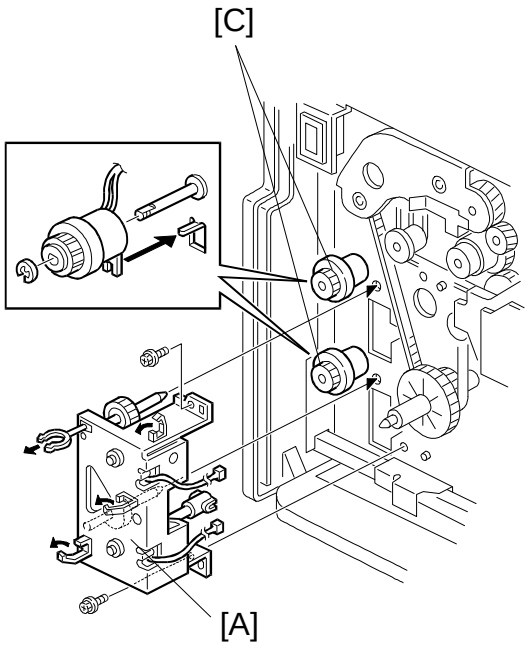
A193R032.wmf

1. Remove the rear cover. (See Rear Cover.)
2. Disconnect the connectors from the right half of the IOCSS board [A] and swing out the IOCSS board (4 screws).
3. Remove the paper end sensor assemblies [B] (1 screw and 1 connector each).
4. Remove the paper end sensors [C].

8.7 PAPER FEED CLUTCHES/RELAY CLUTCHES



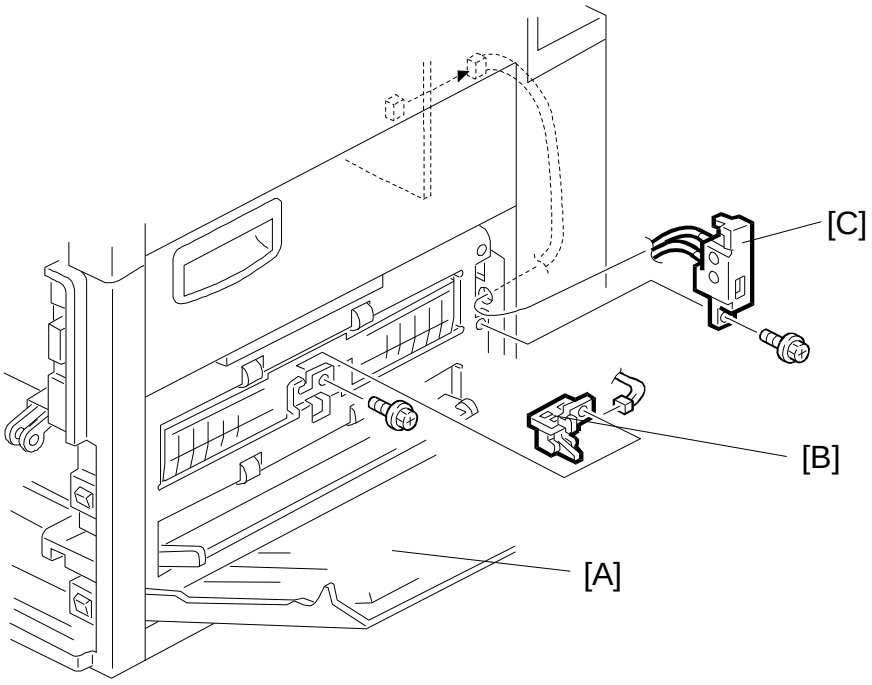
A193R521.wmf



A193R527.wmf

1. Remove the paper feed roller shafts. (See Paper Feed Rollers.)
2. Remove the rear cover. (See Rear Cover.)
3. Remove the paper feed drive bracket [A] (2 screws).
4. Remove the paper feed clutches [B] (1 clip and 1 connector) and relay clutches [C] (1 E-ring and 1 connector).

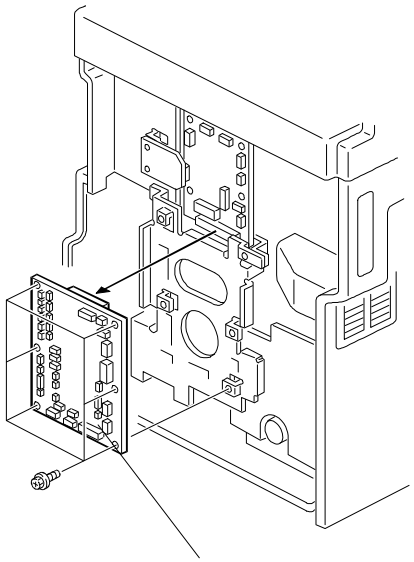
8.8 RELAY SENSOR/RIGHT VERTICAL GUIDE SWITCH



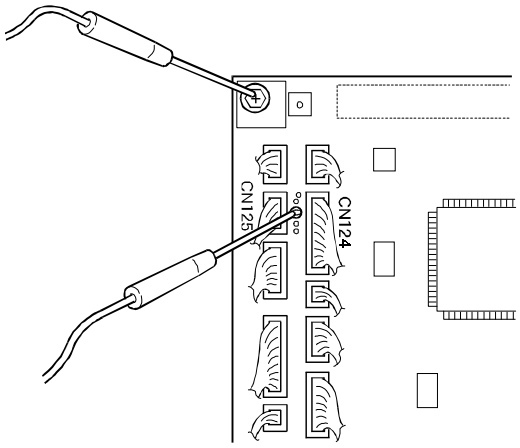
A193R034.wmf

1. Open the right cover [A].
2. Remove the relay sensor [B] (1 connector).
3. Remove the rear cover (See Rear Cover).
4. Remove the right vertical guide switch [C] (1 screw, 1 connector).

9. OTHERS



[A] A193R037.wmf

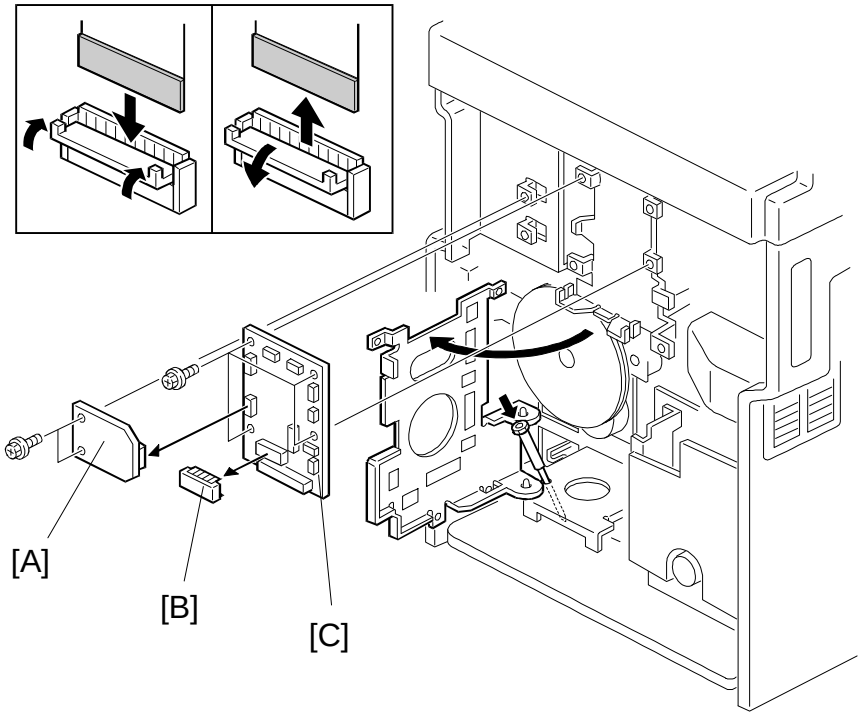


A193R042.wmf

9.1 IOCSS BOARD

1. Remove the rear cover. (See Rear Cover.)
2. Disconnect all connectors from the IOCSS board [A] (33 connectors).
3. Replace the IOCSS board (6 screws).
4. Measure the voltage of the IOCSS board between TP105 and the IOCSS bracket with a multimeter. This is V_{CONT}.
5. Check that the multimeter shows 5.63 ± 0.2 V.
6. If V_{CONT} is not 5.63 ± 0.2 V, access SP2-999 and select 1. Then change the setting of SP 2-996-1 until V_{CONT} is within the specified range.

9.2 MSU BOARD/BICU BOARD

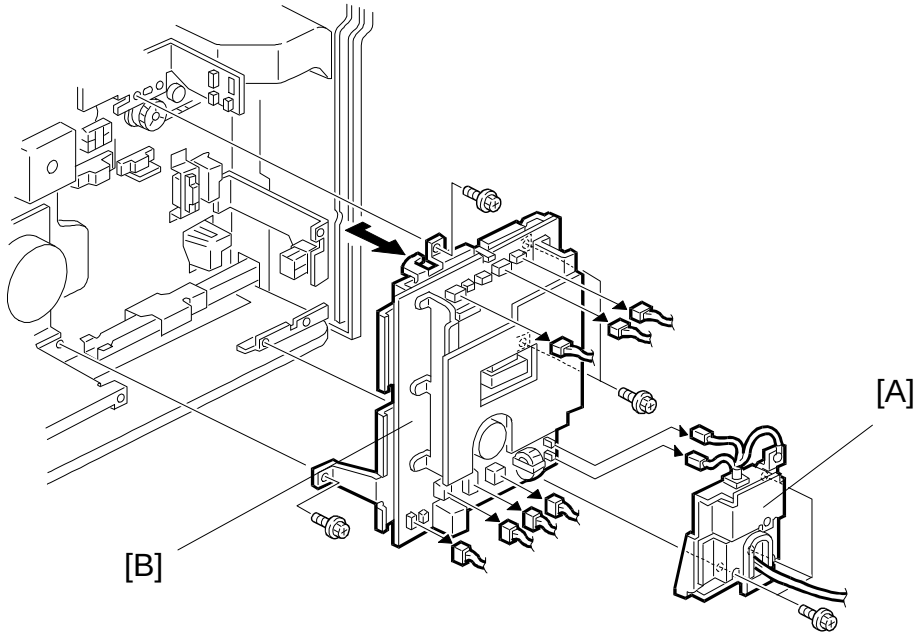


A193R522.wmf

1. Remove the MSU board [A] (2 screws).
2. Disconnect the connectors from the right half of the IOCSS board, remove the 4 screws that secure the bracket, and swing out the IOCSS board.
3. Disconnect all connectors from the BICU board [B] (7 connectors).

   NOTE: When installing the flat cable, push the connector holding the both ends until it clicks into place.
4. Remove the BICU board (4 screws).
5. Remove the NVRAM [C] from the old BICU board and put it on the new BICU board.
6. Install the new BICU board and MSU.

9.3 PSU BOARD



A193R038.wmf

1. Remove the rear cover. (See Rear Cover).
2. Disconnect the connectors from the right half of the IOCSS board, remove the 4 screws that secure the bracket, and swing out the IOCSS board. (See MSU Board/BICU Board.)
3. Remove the power supply cord bracket [A] (3 screws and 2 connectors).
4. Disconnect all connectors of the PSU board.
5. Remove the PSU board bracket assembly [B] (4 screws).

10. STANDARD WHITE DENSITY ADJUSTMENT

This is to adjust the standard white density level.
Perform this adjustment in any of the following conditions:

- After replacing the standard white plate.
- After replacing the NVRAM on the BICU. (If only the BICU is replaced, this adjustment is not necessary, as long as the NVRAM from the old BICU is put on the new BICU.)
- After performing a memory all clear (SP5-801).

Procedure:

1. Place 10 sheets of new A4 sideways or A3 paper on the exposure glass and close the platen cover or the ADF.
2. Enter SP 4-908 and select "1:YES". The standard white density is automatically adjusted.

11. COPY ADJUSTMENT PRINTING/SCANNING

NOTE: 1) You need to perform these adjustment(s) after replacing any of the following parts:

- Scanner Wire
- Lens Block/SBU Assembly
- Scanner Drive Motor
- Polygon Mirror Motor
- Paper Trays
- Duplex Tray
- Paper Side Fence
- Memory All Clear

2) For more details about accessing SP modes, refer to section 4.

11.1 PRINTING

NOTE: 1) Make sure the paper is installed correctly in each paper tray before you start these adjustments.

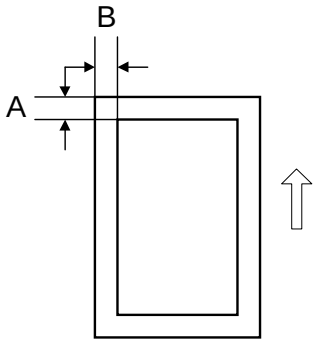
2) Use the Trimming Area Pattern (SP5-902, No.10) to print the test pattern for the following procedures.

3) Set SP 5-902 to 0 again after completing these printing adjustments.

11.1.1 Registration - Leading Edge/Side-to-Side

1. Check the leading edge registration, and adjust it using SP1-001. The specification is: 3 ± 2mm
2. Check the side-to-side registration for each paper feed station, and adjust them using the following SP modes.

	SP mode	Specification
1st paper feed	SP1-002-1	2 ± 1.5 mm
2nd paper feed	SP1-002-2	2 ± 1.5 mm
3rd paper feed (Optional PFU tray 1)	SP1-002-3	2 ± 1.5 mm
4th paper feed (Optional PFU tray 2)	SP1-002-4	2 ± 1.5 mm
By-pass feed	SP1-002-5	2 ± 1.5 mm
Duplex	SP1-002-6	2 ± 1.5 mm



A193R512.wmf

A: Leading Edge Registration
B: Side-to-side Registration

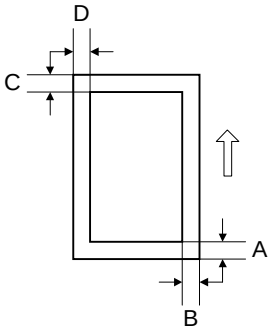
11.1.2 Blank Margin

NOTE: If the leading edge/side-to-side registration can not be adjusted within the specifications, adjust the leading/left side edge blank margin.

1. Check the trailing edge and right side edge blank margins, and adjust them using the following SP modes.

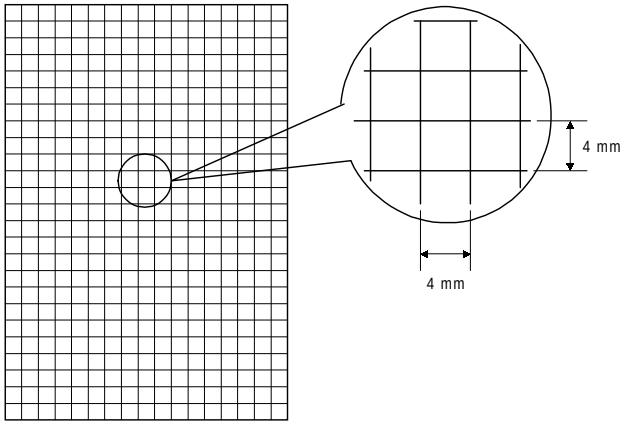
	SP mode	Specification
Trailing edge	SP2-101-2	2±2 mm
Right side edge	SP2-101-4	2±1.5 mm
Leading edge	SP2-101-1	3±2 mm
Left side edge	SP2-101-3	2±1.5 mm

A: Trailing Edge Blank Margin
B: Right Side Edge Blank Margin
C: Leading Edge Blank Margin
D: Left Side Edge Blank Margin



A193R513.wmf

11.1.3 Main Scan Magnification

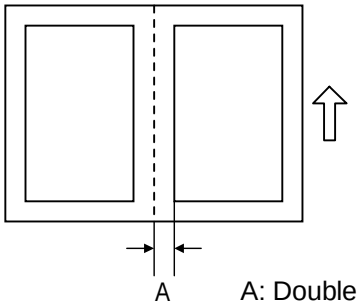


A193R524.wmf

1. Prints the Grid Pattern (SP5-902, No.5).
2. Check the magnification (the grid size should be 4 mm), and adjust the magnification using SP2-998 if necessary. The specification is ± 1%.

11.1.4 Double Copy Registration

NOTE: 1) Perform this adjustment after completing the registration adjustment and the blank margin adjustment for single copies.
2) Select the double copies mode by the Double Copies key using the copy mode to print the test pattern.



A: Double Copy Registration

A193R514.wmf

1. If you need to adjust the double copy registration, use SP1-006.

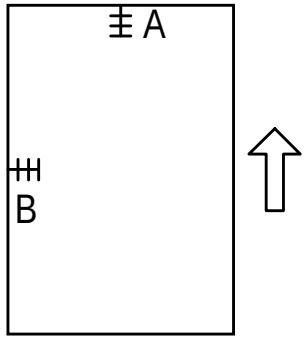
11.2 SCANNING

NOTE: 1) Perform or check the printing registration/side-to-side adjustment and the blank margin adjustment, before doing the following scanner adjustment.
2) Use an OS-A3 test chart to perform the following adjustments.

11.2.1 Registration: Platen Mode

1. Place the test chart on the exposure glass and make a copy from one of the feed stations.
2. Check the leading edge and side-to-side registration, and adjust them using the following SP modes if necessary.

	SP mode
Leading edge	SP4-010
Side-to-side	SP4-011



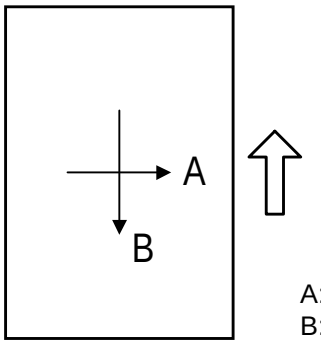
A: Leading Edge Registration
B: Side-to-side Registration

A193R515.wmf

Replacement Adjustment

11.2.2 Magnification

NOTE: Use an OS-A3 test chart to perform the following adjustment.



A: Main Scan Magnification
B: Sub Scan Magnification

A193R517.wmf

1) Main Scan Magnification

1. Place the test chart on the exposure glass and make a copy from one of the feed stations.
2. Check the magnification ratio, and adjust it using the following SP mode if necessary. The specification is ± 1%.

SP mode	
Main Scan Magnification	SP4-008

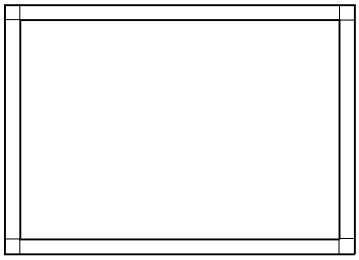
2) Sub Scan Magnification

1. Place the test chart on the exposure glass and make a copy from one of the feed stations.
2. Check the magnification ratio, and adjust it using the following SP mode if necessary. The specification is ± 1%.

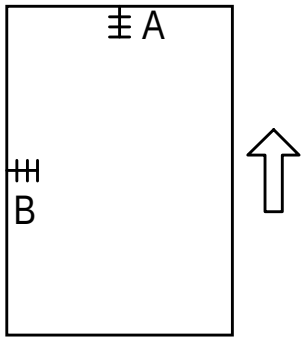
SP mode	
Sub Scan Magnification	SP4-101

11.3 ADF IMAGE ADJUSTMENT

11.3.1 Registration and Blank Margin



A193R516.wmf



A: Leading Edge Registration
B: Side-to-side Registration

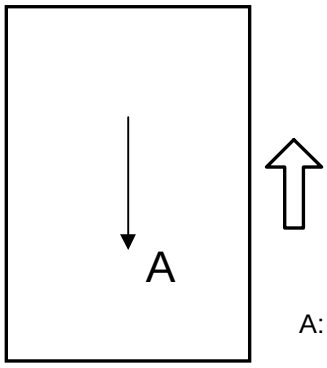
A193R515-2.wmf

NOTE: Make a temporary test chart as shown above using A3/DLT paper.

1. Place the temporary test chart on the ADF and make a copy from one of the feed stations.
2. Check the registration, and adjust using the following SP modes if necessary.

	SP mode
Side-to-side Registration	SP6-006-1
Leading Edge Registration (Simplex)	SP6-006-2
Trailing Edge Blank Margin	SP6-006-3

11.3.2 Sub Scan Magnification



A: Sub scan magnification

A193R526.wmf

NOTE: Make a temporary test chart as shown above using A3/DLT paper.

1. Place the temporary test chart on the ADF and make a copy from one of the feed stations.
2. Check the registration, and adjust using SP 6-007 if necessary. The specification is ± 1%.

12. IMAGE DENSITY ADJUSTMENT BY KEY OPERATOR

Usually, the image density is adjusted with SP2-911 (this changes the coefficient for the TD sensor output). However, if the user wishes to change the image density, the service representative can instruct the user to do this using the following procedure.

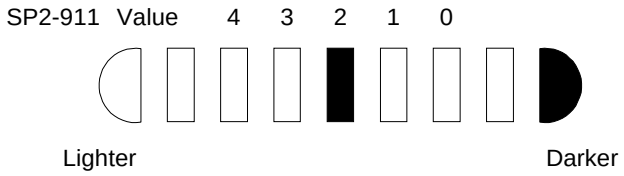


Illustration 1

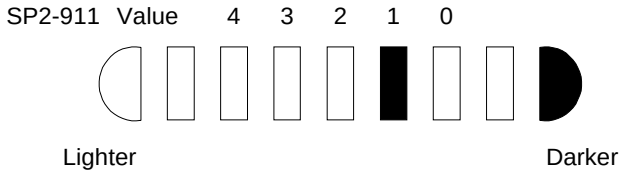


Illustration 2

A193R518.wmf

1. Press the User Tool key.
2. Select the System menu.
3. Press the Darker (or Lighter) key and the # key at the same time.

   NOTE: At this time, the current setting level is displayed on the image density LED. See illustration 1.
4. When holding down both the Darker (or Lighter) key and the # key for over 3 s, the image density LED will be changed to a darker level (or lighter level). See illustration 2.

   NOTE: 1) If the image density level is changes to a darker setting, the machine automatically supplies toner.
   2) Do not select the "0" level.

SECTION 7

TROUBLESHOOTING

1. SERVICE CALL CONDITIONS

1.1 SUMMARY

There are 4 levels of service call conditions.

Level	Definition
A	To prevent the machine from being damaged, the SC can only be reset by a service representative (see the note below). The copier cannot be operated at all.
B	The SC can be reset by turning the main switch off and on if the SC was caused by a sensor error.
C	The copier can be operated as usual except for the unit related to the service call.

NOTE: 1) If the problem concerns electrical circuit boards, first disconnect then reconnect the connectors before replacing the PCBs.

2) If the problem concerns a motor lock, first check the mechanical load before replacing motors or sensors.

3) To reset a Level A SC, enter SP 5-810 (SC code reset) and select "1". Then hold down the Photo mode key and the # key at the same time for at least 3 seconds (this does not require the main switch to be turned off and on).

4) When a Level A or B SC occurs while in an SP mode, the display does not indicate the SC number. If this occurs, check the SC number after leaving the SP mode.

2. SC CODE DESCRIPTIONS

SC120: Scanner home position error 1

-Definition- [B]

The scanner home position sensor does not detect the off condition during initialization or copying.

- Possible causes -

- Scanner home position sensor defective
- Scanner drive motor defective
- IOSCC board defective
- Scanner home position sensor harness defective

SC121: Scanner home position error 2

-Definition- [B]

The scanner home position sensor does not detect the on condition during initialization or copying.

- Possible causes -

- Scanner home position sensor defective
- Scanner drive motor defective
- IOCSS board defective
- Scanner home position sensor harness defective

SC122: Scanner home position error 3

-Definition- [B]

The scanner home position sensor detects the on condition while the scanner is returning to the home position.

- Possible causes -

- Scanner home position sensor defective
- Scanner drive motor defective
- IOCSS board defective
- Scanner home position sensor harness defective

SC123: Scanner home position error 4

-Definition- [B]

The scanner home position sensor does not detect the on condition after the scanner returns to the home position.

- Possible causes -

- Scanner home position sensor defective
- Scanner drive motor defective
- IOCSS board defective
- Scanner home position senor harness defective

SC192: Automatic SBU adjustment error

-Definition- [B]

An error is detected during automatic SBU adjustment.

- Possible cause -

- SBU defective
- BiCU board defective
- Lamp regulator defective
- Exposure lamp deective
- Dirty white plate

SC302: Charge roller current leak

-Definition- [B]

A charge roller current leak signal is detected.

- Possible causes -

- Charge roller damaged
- Charge high voltage supply board defective
- Poor connection of the PCU

SC306: Charge roller home position error

-Definition- [B]

The charge roller contact sensor does not detect the on condition.

- Possible causes -

- Charge roller contact sensor defective
- Charge roller contact clutch defective

SC320: Polygon motor error

-Definition- [B]

The polygon motor does not reach its operating speed within 10 seconds after the polygon motor on signal, or the lock signal is not detected for more than 40 ms continuously during operation.

- Possible causes -

- Polygon motor defective
- Poor connection of the interface harness which connects the polygon motor driver and the IOCSS board
- IOCSS board defective

SC321: No laser start signal (F-GATE error)

NOTE: This SC code is only for copy mode.

- Definition- [B]

The CPU does not detect the laser start signal (F-GATE) after the copy paper reaches the registration sensor.

- Possible causes -

- BiCU board defective
- MSU board defective

SC322: Laser synchronization error

-Definition- [B]

The laser synchronization signal cannot be detected by the main scan synchroniziation detector board for more than 5 consecutive 100 intervals.

- Possible causes -

- Poor connection of the interface harness which connects the laser synchronization detector board and the BiCU board
- Laser synchronization detector board out of position
- Laser synchronization detector board defective
- BiCU board defective

SC324: LD drive current over

-Definition- [B]

The LD drive board applies more than 100 mA to the LD.

- Possible causes -

- LD unit defective (not enough power, due to aging)
- Poor connection of the interface harness which connects the LD unit and the BiCU board
- Temperature around the LD unit is too high

SC390: TD sensor error 1

-Definition- [B]

The TD sensor outputs less than 0.5V, 20 s after the TD sensor initial setting has been performed.

- Possible causes -

- TD sensor abnormal
- Poor connection of the PCU

SC391: Development bias leak

-Definition- [B]

A development bias leak signal is detected.

- Possible causes -

- Poor connection of the PCU
- High voltage supply board defective

SC393: TD sensor error 2

-Definition- [B]

TD sensor output voltage falls out of the adjustment range (2.0 ± 0.2 V) after the TD sensor initial setting has been finished.

- Possible causes -

- TD sensor abnormal
- Poor connection of the PCU

SC401: Transfer roller leak error 1
SC402: Transfer roller leak error 2

-Definition- [B]

A transfer roller current leak signal is detected.

- Possible causes -

- High voltage supply board defective
- Poor connection of the PCU
- Transfer roller damaged

SC411: Separation bias error

-Definition- [B]

A separation bias leak signal is detected.

- Possible causes -

- High voltage supply board defective
- Poor connection of the PCU
- Discharge brush defective

SC500: Main motor lock

-Definition- [B]

A main motor lock signal is detected for more than 5 seconds or the lock signal is not detected for more than 500 ms during rotation.

- Possible causes -

- Too much load on the drive mechanism
- Main motor defective

SC503: Upper tray lift motor malfunction (optional paper tray unit only)
SC504: Lower tray lift motor malfunction (optional paper tray unit only)

-Definition- [C]

The paper upper limit sensor is not activated after the tray lift motor has been on for 10 seconds.

- Possible causes -

- Upper limit sensor defective
- Tray lift motor defective
- IOCSS board defective

SC506: Paper tray unit main motor lock (optional paper tray unit only)

-Definition- [C]

A main motor lock signal is detected for more than 5 seconds or the lock signal is not detected for more than 5 seconds during rotation.

- Possible causes -

- Paper tray unit main motor defective
- Too much load on the drive mechanism

SC542: Fusing temperature warm-up error

-Definition- [A]

The fusing temperature does not reach the fusing standby temperature within 50 seconds after the main switch is turned on.

- Possible causes -

- Fusing thermistor defective or out of position
- Fusing lamp open
- Fusing thermofuse open
- Power supply board defective
- Poor connection of the fusing unit

SC543: Fusing overheat error

-Definition- [A]

A fusing temperature of over 231°C is detected for 1 second by the fusing thermistor.

- Possible causes -

- Fusing thermistor defective
- Power supply board defective

SC544: Fusing low temperature error

-Definition- [A]

A fusing temperature of lower 100°C is detected for 1 second by the fusing thermistor.

- Possible causes -

- Fusing thermistor defective
- Power supply board defective

SC546: Fusing ready temperature malfunction

-Definition- [A]

The fusing temperature goes 10 °C below or 10 °C over the stand-by temperature after warm-up is completed.

- Possible causes -

- Thermistor defective
- Poor connection of the fusing unit
- Power supply board defective

SC547: Zero cross signal malfunction

-Definition- [A]

Zero cross signals are not detected within a certain period.

- Possible causes -

- Power supply board defective
- IOCSS defective
- BICU defective

SC610: Communication error between IOCSS and duplex unit

-Definition- [B]

The IOCSS board cannot communicate with the duplex unit properly.

- Possible causes -

- Poor connection of the duplex unit
- IOCSS board defective
- Duplex control board defective

SC691: Communication error between BICU and fax controller

-Definition- [B]

The BiCU board cannot communicate with the fax controller properly.

- Possible causes -

- Poor connection of the interface harness which connects the BiCU board and the fax controller
- BICU board defective
- Fax controller defective

SC692: Communication error between BiCU and printer controller

-Definition- [B]
The BICU board cannot communicate with the printer controller properly.

- Possible causes -
- Poor connection of the interface harness which connects the BICU board and the mother board.
- Poor connection between the mother board and the printer controller
- BICU board defective
- Printer controller defective
- Mother board defective

SC900: Total counter error

-Definition- [C]
The total counter is not working properly.

- Possible causes -
- Total counter defective
- IOCSS board defective

SC920: MSU connection error

-Definition- [B]
The MSU set signal is not detected

- Possible cause -
- Poor connection between the BICU board and the MSU
- BICU board defective
- MSU defective

SC921: MSU hardware error

-Definition- [B]
The hardware of the MSU is defective

- Possible cause -
- MSU defective
- BICU defective
- Front door safety switch does not work properly

SC980: Program loading error

-Definition- [C]
The program cannot load properly.

- Possible cause -
- Poor connection between the BICU and the ROM board
- BICU board defective
- ROM board or the program defective

SC981: NVRAM clear error

-Definition- [C]
The data stored in the NVRAM is not cleared properly when the Memory All Clear is performed.

- Possible cause -
- NVRAM defective

SC990: Communication error between BICU and IOCSS board

-Definition- [B]
The BiCU board cannot communicate with the IOCSS board properly.

- Possible cause -
- Poor connection between the BiCU board and the IOCSS board
- BiCU board defective
- IOCSS board defective

3. ELECTRICAL COMPONENT DEFECTS

3.1 SENSORS

Component (Symbol)	CN	Condition	Symptom
Upper Exit (S1)	157-11 (IOCSS)	Open	The Paper Jam indicator will light whenever a copy is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Lower Exit (S2)	157-8 (IOCSS)	Open	The Paper Jam indicator will light whenever a copy is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Left Vertical Door (S3)	157-5 (IOCSS)	Open	The Door Open indicator does not light even if the left vertical door is opened.
		Shorted	The Door Open indicator lights even if the left vertical door is closed.
Left Door (S4)	157-2 (IOCSS)	Open	The Door Open indicator does not light even if the left door is opened.
		Shorted	The Door Open indicator lights even if the left door is closed.
Relay (S5)	104-2 (IOCSS)	Open	The Paper Jam indicator will light whenever a copy is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
PCU Detect (S6)	151-1 (IOCSS)	Open	The TD sensor initial setting procedure is not performed when a new PCU is installed.
		Shorted	The TD sensor initial setting procedure is performed whenever the front cover is closed.
Fusing Exit (S7)	151-6 (IOCSS)	Open	The Paper Jam indicator will light whenever a copy is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Charge Roller Contact (S8)	151-9 (IOCSS)	Open	No Symptom
		Shorted	SC306 is displayed.
Upper Tray Paper End (S9)	103-2 (IOCSS)	Open	The Paper End indicator lights even if paper is placed in the upper paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the upper paper tray.
Lower Tray Paper End (S10)	103-5 (IOCSS)	Open	The Paper End indicator lights even if paper is placed in the lower paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the lower paper tray.
By-pass Feed Paper End (S11)	119-4 (IOCSS)	Open	The Paper End indicator lights even if paper is placed on the by-pass feed tray.
		Shorted	The Paper End indicator does not light even if there is no paper on the by-pass feed tray.

Component (Symbol)	CN	Condition	Symptom
Registration (S12)	119-6 (IOCSS)	Open	The Paper Jam indicator will light whenever a copy is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
By-pass Feed Paper Width (S13)	122-1~4 (IOCSS)	Open	The CPU cannot detect the proper paper width.
		Shorted	
Humidity (S14)	109-3 (IOCSS)	Open	A lighter image copy will be made.
		Shorted	A darker image copy will be made.
Original Width (S15)	131-2~3 (IOCSS)	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	
Original Length-1 (S16)	132-A1~A2 (IOCSS)	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	
Original Length-2 (S17)	132-A8~A9 (IOCSS)	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	
Platen Cover (S18)	132-B7 (IOCSS)	Open	APS and ARE do not function correctly.
		Shorted	No symptom
Scanner H.P (S19)	132-B9 (IOCSS)	Open	SC120 is displayed.
		Shorted	The CPU does not detect the scanner home position and the scanner motor does not stop.
Toner Density (S20)	125-3 (IOCSS)	Open	SC393 is displayed. (See the note.)
		Shorted	SC390 is displayed. (See the note.)

NOTE: An SC condition occurs only when a new PCU is being installed in the machine. During copying, if the TD sensor fails, the image density will be changed.

3.2 SWITCHES

Component (Symbol)	CN	Condition	Symptom
AC (SW1)	282-1,2 (PSU)	Open	The machine does not turn on.
		Shorted	The machine does not turn off.
Main (SW2)	309-12 (BICU)	Open	The LCD does not off even if the main switch is turned off.
		Shorted	The LCD does not on even if the main switch is turned on.
Right Vertical Guide (SW3)	112-2 (IOCSS)	Open	The Cover Open indicator is not lit even if the right vertical guide is opened.
		Shorted	The Cover Open indicator is lit even if the right vertical guide is closed.
Upper Paper Size (SW4)	102-1,2,4,5 (IOCSS)	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a copy is made.
		Shorted	
Lower Paper Size (SW5)	102-6,7,9,10 (IOCSS)	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a copy is made.
		Shorted	
Front Door Safety (SW6)	120-1,134-3 (IOCSS)	Open	The Cover Open indicator is not lit even if the right vertical guide is opened.
		Shorted	The Cover Open indicator is lit even if the right vertical guide is closed.

4. BLOWN FUSE CONDITIONS

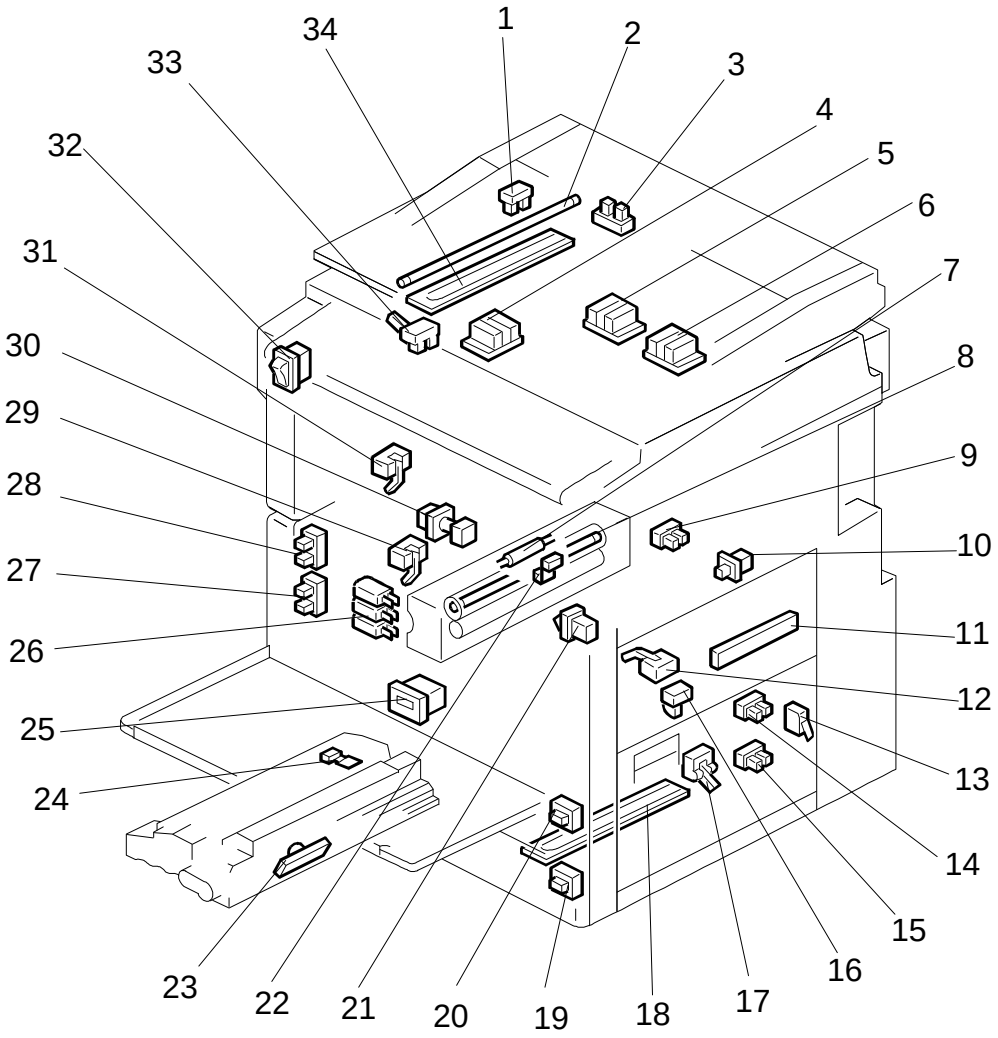
Fuse	Rating		Symptom when turning on the main switch
	115 V	220 ~ 240 V	
Power Supply Board			
FU1	15 A/125 V	----	No response.
FU2	8 A/125 V	5 A/250 V	No response
FU4	6.3 A/125 V	6.3 A/125 V/250V	"Doors/Covers Open" is displayed then SC120 is displayed
FU5	4 A/125 V	4 A/125 V/250 V	SC900 is displayed
FU6	4 A/125 V	4 A/125 V/250 V	Normal operation (This fuse is on the +24V line of CN287 but it is not used.)

SECTION 8

OPTIONS

ELECTRICAL COMPONENT LAYOUT

Copier



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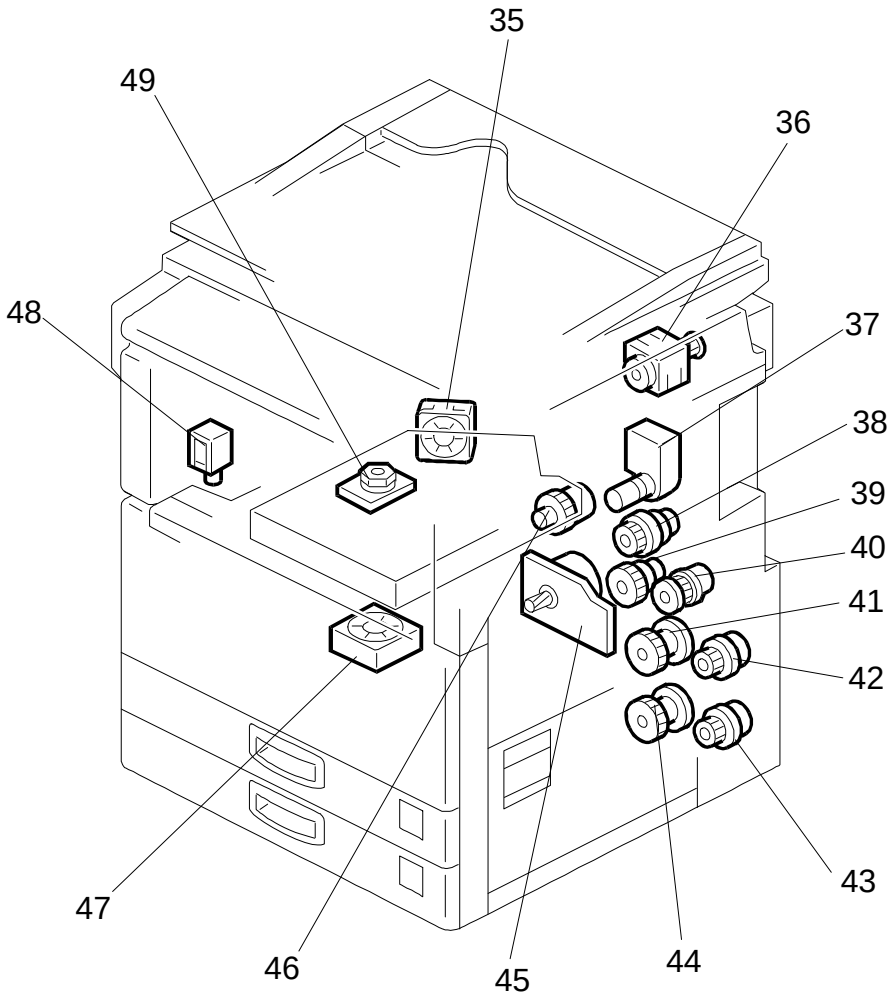
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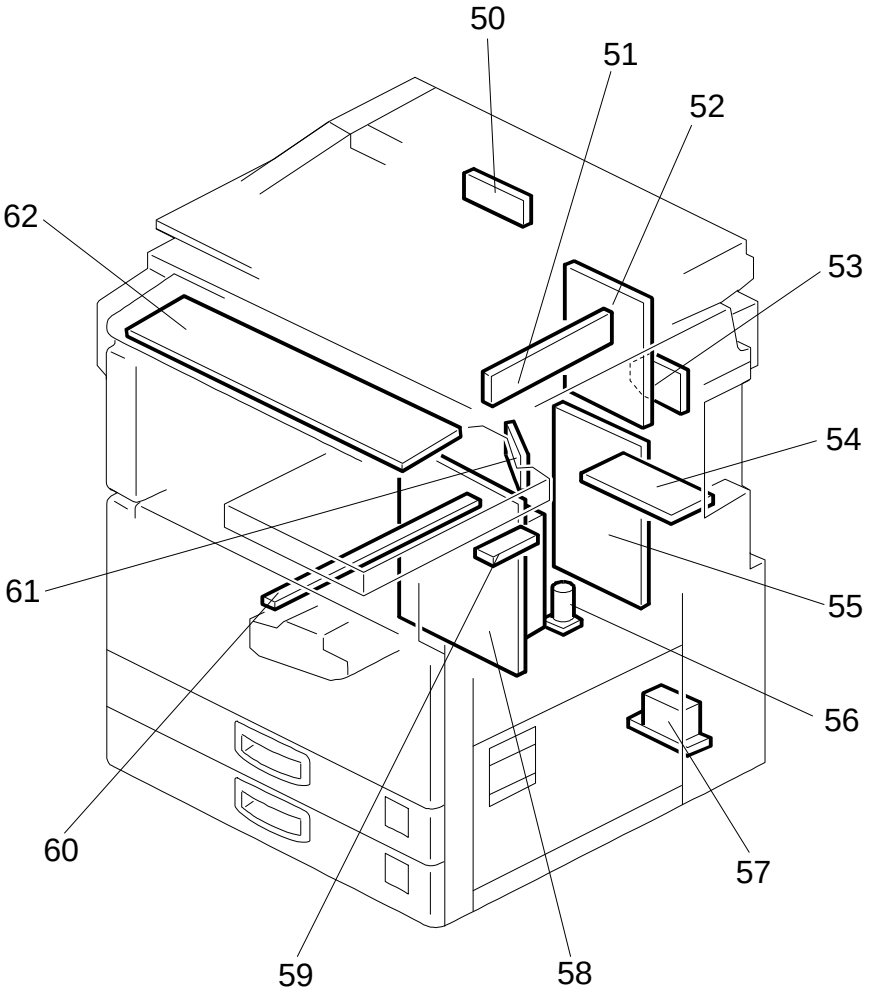
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Copier

Symbol	Index No.	Description	P to P (1/2)
Printed Circuit Boards			
PCB1	54	High Voltage Supply Board	K17
PCB2	50	Lamp Stabilizer	M16
PCB3	58	PSU	C7
PCB4	61	LD Unit	E5
PCB5	62	Operation Panel	F1
PCB6	51	SBU	H1
PCB7	55	IOCSS	I14
PCB8	52	BICU	H12
PCB9	53	MSU	I6
Motors			
M1	45	Main	I17
M2	36	Scanner Drive	N17
M3	47	Transport Vacuum Fan	O17
M4	49	Polygonal Mirror	D4
M5	37	Toner Supply	F17
M6	35	Exhaust Fan	D17
Sensors			
S1	33	Upper Exit	B17
S2	31	Lower Exit	B17
S3	28	Left Vertical Door	B17
S4	27	Left Door	C17
S5	17	Relay	C17
S6	10	PCU	C17
S7	29	Fusing Exit	D17
S8	9	Charge Roller H.P	D17
S9	14	Upper Tray Paper End	E17
S10	15	Lower Tray Paper End	E17
S11	16	By-pass Feed Paper End	F17
S12	12	Registration	G17
S13	11	By-pass Feed Paper Width	G17
S14	59	Humidity	C11
S15	4	Original Width	L17
S16	5	Original Length-1	L17
S17	6	Original Length-2	L17
S18	3	Platen Cover	M17
S19	1	Scanner H.P.	M17
S20	23	Toner Density (TD)	H17
Switches			
SW1	21	AC	B6
SW2	32	Main	D2
SW3	13	Right Vertical Guide	H17

Symbol	Index No.	Description	P to P (1/2)
SW4	20	Upper Paper Size	N17
SW5	19	Lower Paper Size	O17
SW6	26	Front Door Safety	D11
Magnetic Clutches			
MC1	46	Charge Roller Contact	E17
MC2	42	Upper Relay	E17
MC3	43	Lower Relay	I17
MC4	40	By-pass Feed	F17
MC5	41	Upper Paper Feed	I17
MC6	44	Lower Paper Feed	I17
MC7	39	Registration	F17
MC8	38	Development	J17
Solenoids			
SOL1	48	Junction Gate	B17
Lamps			
L1	60	Quenching	E17
L2	2	Scanner	M17
L3	8	Fusing	B7
Heaters			
H1	18	Tray (option)	C4
H2	34	Anti-condensation (option)	D4
Thermistors			
TH1	24	Charge Roller	H17
TH2	22	Fusing	B6
Thermofuses			
TF1	7	Fusing	B7
Counters			
CO1	25	Total	I17
CO2	---	Key (option)	G17
Others			
LSD1	30	Laser Synchronization Detector	D4
NF	56	Noise Filter (230V machine only)	C10
CB	57	Circuit Breaker (230V machine only)	B8

A193 Point to Point Diagram (1/2)

Signal Table

———	AC Line
———	DC Line
- - - - - - - -	Pulse Signal
< >	Signal Direction
▲	Active High
▼	Active Low
[ ]	Voltage
[A]	Analog Signal

AC SW (SW1)
Thermistor (TH2)
Fusing Lamp (L3)
Thermofuse (TF1)
Circuit Breaker (230V machine only) (CF1)
CN282 CN284 CN287 T2S1 T2S0

Tray Heater (Option) H1 CN285
Anti-condensation Heater (Option) H2 CN285

PSU(PCB3)

Noise Filter (230V machine only) (NF 1) CN280

Main Switch (SW2)
Laser Syncronization Detector(LSD)
Polygonal Mirror Motor M4

LD Unit (PCB4)

CN288 CN283 CN290 CN289 CN281 CN286

Duplex Unit (Op)

Duplex Entrance Sensor S1
Duplex Junction Gate Sol SOL1
Duplex Transport Motor M1
Duplex Feed Motor M2
Duplex Control Board (PCB1) CN241 CN242 CN240 CN243
Duplex Turn Sensor S2
Duplex Exit Sensor S3
CN161 CN162

Humidity Sensor S14 CN163

Front Door Safety SW (SW6) CN120

CN134 CN113 CN123

/ACDET
Zero cross [▼5]
Fusing Heat Trigger [▲5]
Fusing Heat Relay [▼24]
24V.S
ENGOFF
5VE

CN306 CN307 CN305

CN157 CN104 CN126 CN151 CN103 CN111 CN118 CN116 CN119 CN122 CN137 CN117 CN125 CN110 CN108 CN107 CN106 CN121 CN124 CN131 CN132 CN150 CN112 CN105 CN153

SOL1 Junction Gate C1
S1 Upper Exit Sensor
S2 Lower Exit Sensor
S3 Left Vertical Door Sensor
S4 Left Door Sensor
S5 Relay Sensor
S6 PCU Sensor
M6 Exhaust Fan
S7 Fusing Exit Sensor
S8 Charge Roller H.P Sensor
MC1 Charge Roller Contact Cl
L1 Quenching Lamp
S9 Upper Tray Paper End Sensor
S10 Lower Tray Paper End Sensor
MC2 Upper Relay Cl
MC7 Registration Cl
MC4 By-pass Feed Cl
M5 Toner Supply Motor
S11 By-pass Feed Paper End Sensor
S12 Registration Sensor
S13 By-pass Feed Paper Width Sensor
C02 Key Counter (Op)
Right Vertical Guide SW (SW3)
TH1 Charge Roller Thermistor
S20 TD Sensor
MC5 Upper Paper Feed Cl
MC3 Lower Relay Cl
MC6 Lower Paper Feed Cl
CO1 Total Counter
MC8 Development Cl
M1 Main Motor
PCB1 High Voltage Supply Board
S15 Original Width Sensor
S16 Original Length Sensor 1
S17 Original Length Sensor 2
PCB2 Scanner Lamp
L2 Lamp Stabilizer
S18 Platen Cover Sensor
S19 Scanner H.P Sensor
M2 Scanner Drive Motor
SW4 Upper Paper Size Sensor
SW5 Lower Paper Size Sensor
M3 Transport Vacuum Fan

Operation Panel (PCB5)
SBU (PCB6) CN301
CN308 CN130

<CN301> (SBU)

PIN	NAME	PIN	NAME
1	< /OPBSYNC	26	< AD0
2	/RDSYNC >	27	GND
3	GND	28	AGC0 >
4	/CLK 0 >	29	AGC1 >
5	GND	30	GND
6	/WTGT >	31	AGC2 >
7	/PWIND >	32	AGC3 >
8	/AEMODE >	33	GND
9	GND	34	+12
10	DAD 1 >	35	+12
11	GND	36	+12
12	DACLK >	37	+12
13	GND	38	+12
14	DALD >	39	+12
15	GND	40	GND
16	< AD7	41	-12V
17	< AD6	42	-12V
18	GND	43	-12V
19	< AD5	44	GND
20	< AD4	45	+5V
21	GND	46	+5V
22	< AD3	47	+5V
23	< AD2	48	+5V
24	GND	49	+5V
25	< AD1	50	+5V

<CN311> (BICU - ROM Board)

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
1	GND	21	A12 >	41	< D14 >	61	< /SLEEP
2	< D3 >	22	A7 >	42	< D15 >	62	NC
3	< D4 >	23	A6 >	43	/CE2 >	63	NC
4	< D5 >	24	A5 >	44	NC	64	NC
5	< D6 >	25	A4 >	45	NC	65	< D8 >
6	< D7 >	26	A3 >	46	NC	66	< D9 >
7	/CE1 >	27	A2 >	47	A17 >	67	< D10 >
8	A10 >	28	A1 >	48	A18 >	68	NC
9	/OE >	29	A0 >	49	A19 >	69	GND
10	A11 >	30	< D0 >	50	A20 >	70	GND
11	A9 >	31	< D1 >	51	A21 >		
12	A8 >	32	< D2 >	52	+5V		
13	A13 >	33	NC	53	VPP2		
14	A14 >	34	GND	54	A22 >		
15	/WE >	35	GND	55	A23 >		
16	/BSY >	36	GND	56	< /WP		
17	+5V	37	NC	57	< /BYTE		
18	VPP1	38	< D11 >	58	NC		
19	A16 >	39	< D12 >	59	NC		
20	A15 >	40	< D13 >	60	< /EXCARD		

<CN308> (BICU - IOCSS)

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
1	-12V	21	< FUTMP	41	+12V	61	GND
2	-12V	22	< PP-C	42	BDTCT	62	< CHTMP
3	+5VE	23	< PP-B	43	+12V	63	GND
4	+5VS	24	< HUM	44	+5V	64	< PP-TP
5	S1 >	25	< PP-D	45	+5V	65	GND
6	S3 >	26	GND	46	S2 >	66	< TSENS
7	A0 >	27	GND	47	+5V	67	GND
8	A2 >	28	MA1 >	48	A1 >	68	GND
9	A3 >	29	MA2 >	49	+5V	69	GND
10	< D9 >	30	MA4 >	50	< D8 >	70	MA3 >
11	< D10 >	31	MA5 >	51	+5V	71	GND
12	< D12 >	32	MA7 >	52	< D11 >	72	MA6 >
13	< D13 >	33	MA8 >	53	+5V	73	GND
14	< D15 >	34	MA10 >	54	< D14 >	74	MA9 >
15	/RD >	35	MB1 >	55	+5V	75	GND
16	/RST, 10B>	36	MB2 >	56	/HWR >	76	GND
17	< /INT 1	37	MB3 >	57	+5V	77	GND
18	CLKP >	38	MB4 >	58	< /INT2	78	+24V
19	GND	39	/RTRG >	59	GND	79	+24V
20	GND	40	< SN-ON	60	GND	80	BDTCT

BICU (PCB8)

CN310 CN304 CN303

MSU(PCB9)

<CN303> (BICU - MSU)

PIN	NAME	PIN	NAME
1	GND	31	GND
2	GND	32	GND
3	/MWCLK >	33	GND
4	/MWLGT >	34	GND
5	/MWLSYC >	35	/MWFGT >
6	MOD >	36	GND
7	GND	37	GND
8	< /MRCLK	38	GND
9	< /MRLGT	39	/WRSYNC >
10	< /MRLSYC	40	< /MRFGT
11	< MID	41	GND
12	GND	42	GND
13	A7(N,C)	43	A6(N,C)
14	A5(N,C)	44	A4 >
15	A3 >	45	A2 >
16	A1 >	46	A0 >
17	GND	47	GND
18	< D15 >	48	< D14 >
19	< D13 >	49	< D12 >
20	< D11 >	50	< D10 >
21	< D9 >	51	< D8 >
22	/RD >	52	/HWR >
23	CS50 >	53	/CS51 >
24	/RESET >	54	< /MDTCT
25	GND	55	GND
26	+5V	56	+5V
27	+5V	57	+5V
28	+5V	58	+5V
29	GND	59	GND
30	GND	60	GND

<CN310> (BICU-Mother Board)

PIN	NAME	PIN	NAME
1	GND	11	GND
2	< MDEO	12	TXD 2 >
3	GND	13	< RXD 2
4	/FGATE >	14	GND
5	/OE 2 >	15	TXD 3 >
6	/OE 3 >	16	< RXD 3
7	N.C.	17	GND
8	GND	18	/BD >
9	/RTS >	19	N.C.
10	< /CTS	20	/WRSYNC >

Mother Board

CN1 CN304

Printer Controller (Op)
See 2/2

Fax Unit (Op)
See 2/2

CN150 +5V GND

Paper Tray Unit (Option)

Upper Paper Size Sensor S7
Lower Paper Size Sensor S8
Upper Paper End Sensor S1
Lower Paper End Sensor S2
Upper Relay Sensor S5
Lower Relay Sensor S6
Tray Cover SW (SW1)
Upper Paper Feed Cl MC1
Lower Paper Feed Cl MC2
Upper Relay Cl MC3
Lower Relay Cl MC4
Paper Feed Motor M1
Upper Paper Lift Motor M2
Lower Paper Lift Motor M3
Upper Tray Upper Limit Sensor S3
Lower Tray Upper Limit Sensor S4
Tray Heater H1

Paper Tray Unit Drive Board (PCB1) CN101 CN102

IOCSS (PCB7)

Upper PE [▲5]
Lower PE [▲5]
Upper Relay SN [▼5]
Lower Relay SN [▼5]
U.P.FC1 [▼24]
L.P.FC1 [▼24]
U. RC1 [▼24]
L. RC1 [▼24]
/MTST [▼5]
/MTRDY [▼5]
F3UP [▼24]
F3DN [▼24]
F4UP [▼24]
F4DN [▼24]
LIMIT1 [▲5]
LIMIT2 [▲5]
/HEAT [▼24]
/SET [▼5]

ADF (Op)

DF Feed Motor M1
DF Pick-up Sol SOL1
Stamper Sol SOL2
DF Feed Cl MC1
APS Start Sensor S1
DF Position Sensor S2
Feed Cover Open Sensor S4
Original Length-2 Sensor S9
Original Length-1 Sensor S8
Original Width-3 Sensor S7
Original Width-2 Sensor S6
Original Width-1 Sensor S5
Original Set Sensor S10
Registration Sensor S3

DF Drive Board (PCB1) CN130 CN145 CN150 CN139 CN140 CN135

Feed Motor /B [▼▲5]
Feed Motor B [▼▲5]
Feed Motor /A [▼▲5]
Feed Motor A [▼▲5]
Feed Clutch [▼24]
Pick-up Sol [▼24]
Stamper Sol [▼24]
DF Set [▼24]
ARDF Set [▼5]
ARDF Orig. SN [▼5]
Motor Speed Cont [▼5]
ARDF Motor (+) [▼5]
ARDF Motor (-) [▼5]
ARDF Sol [▼5]
Original Width-1 [▼5]
Registration [▲5]
Original Width-2 [▼5]
APS Start [▼5]
Original Width-3 [▼5]
DF Position [▼5]
Original Set [▼5]
Feed Cover Open [▼5]
Original Length-1 [▲5]
Original Length-2 [▲5]

1 bin Sorter (Op)

Junction Gate Sol [▼5]
Motor Speed [▲5]
Motor Start [▼5]
Paper Indicator1 [▼5]
Paper Indicator2 [▼5]
Paper Detect [▲5]
DOOR SW [▲5]
Sorter Set [▼5]

1bin Sorter Drive Board (PCB1) CN153

Sorter Transport Motor M1
Sorter Paper Indicator (PCB2) PCB2
Sorter Vertical Guide Door SW (SW1)
Sorter Junction Gate Sol SOL1
Sorter Pape Sensor S1

A193 Point to Point Diagram (2/2)

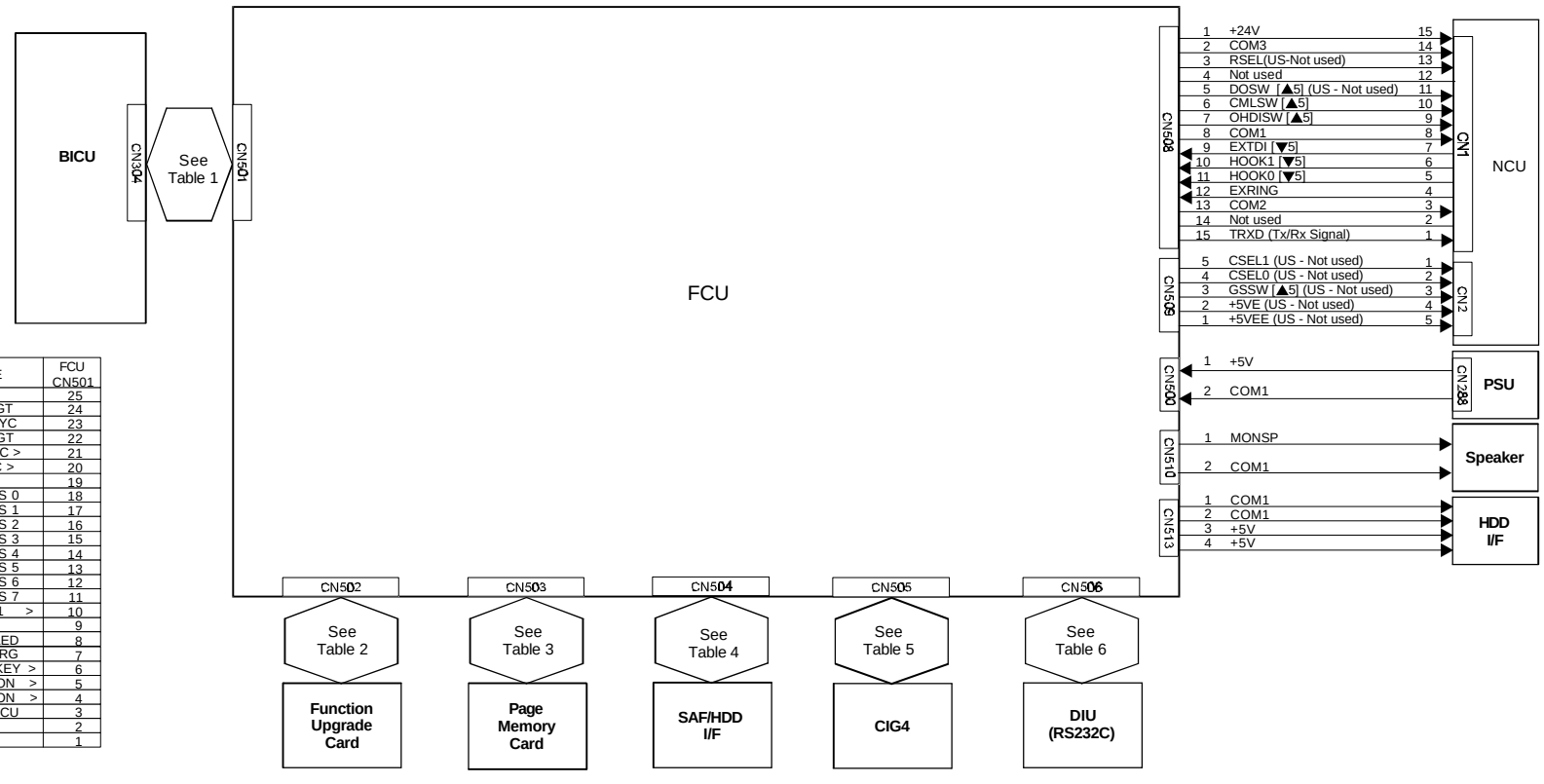

Table 1 (BICU - FCU)

BICU CN304	NAME	FCU CN501	BICU CN304	NAME	FCU CN501
1	+24V	50	26	GND	25
2	+24V	49	27	< /ARLGT	24
3	+12V	48	28	< /ARLSYC	23
4	-12V	47	29	< /ARFGT	22
5	TXD 1 >	46	30	/WRSYNC >	21
6	< RXD 2	45	31	/FSYNC >	20
7	GND	44	32	GND	19
8	/AWCLK >	43	33	< /ARKS 0	18
9	GND	42	34	< /ARKS 1	17
10	/AWLGT >	41	35	< /ARKS 2	16
11	/AWLSYC >	40	36	< /ARKS 3	15
12	/AWFGT >	39	37	< /ARKS 4	14
13	GND	38	38	< /ARKS 5	13
14	/AWKS 0 >	37	39	< /ARKS 6	12
15	/AWKS 1 >	36	40	< /ARKS 7	11
16	/AWKD 0 >	35	41	/OE 1 >	10
17	/AWKD 1 >	34	42	GND	9
18	/AWKD 2 >	33	43	< /OP-LED	8
19	/AWKD 3 >	32	44	< /RTRG	7
20	/AWKD 4 >	31	45	/OP-KEY >	6
21	/AWKD 5 >	30	46	/SW-ON >	5
22	/AWKD 6 >	29	47	/SN-ON >	4
23	/AWKD 7 >	28	48	< EX-FCU	3
24	GND	27	49	+5VE	2
25	< /ARCLK	26	50	+5VE	1

Table 2 (Function Upgrade Card - FCU)

FCU CN502	NAME	FCU CN502	NAME
1	COM1	35	COM1
2	< CPD 3 >	36	< CD1
3	< CPD 4 >	37	< CPD 11 >
4	< CPD 5 >	38	< CPD 12 >
5	< CPD 6 >	39	< CPD 13 >
6	< CPD 7 >	40	< CPD 14 >
7	/CROMCSO >	41	< CPD 15 >
8	CPA 10 >	42	/CRAMCSO >
9	/MRD >	43	N.C
10	CPA 11 >	44	< /FROMCS >
11	CPA 9 >	45	N.C
12	CPA 8 >	46	CPA 17 >
13	CPA 13 >	47	CPA 18 >
14	CPA 14 >	48	CPA 19 >
15	/MWRL >	49	CPA 20 >
16	< BSY	50	< RAMCS
17	+5V	51	+5V
18	+12VP	52	+12VP
19	CPA 16 >	53	N.C
20	CPA 15 >	54	N.C
21	CPA 12 >	55	< /WP
22	CPA 7 >	56	< /BYTE
23	CPA 6 >	57	N.C
24	CPA 5 >	58	/MWRH >
25	CPA 4 >	59	/EXCARD >
26	CPA 3 >	60	< /SLEEP
27	CPA 2 >	61	/VPCNT0 >
28	CPA 1 >	62	< /VPCNT1
29	CPA 0 >	63	< /CSCNT
30	< CPD 0 >	64	< CPD 8 >
31	< CPD 1 >	65	< CPD 9 >
32	< CPD 2 >	66	< CPD 10 >
33	RTCCS >	67	< CD2
34	COM 1	68	COM 1

Table 3 (Page Memory Card - FCU)

FCU CN503	NAME	FCU CN503	NAME
1	COM1	35	COM 1
2	< DMD 3 >	36	< CD 1
3	< DMD 4 >	37	< DMD 11 >
4	< DMD 5 >	38	< DMD 12 >
5	< DMD 6 >	39	< DMD 13 >
6	< DMD 7 >	40	< DMD 14 >
7	/RAS 4 >	41	< DMD 15 >
8	N.C	42	/RAS5 >
9	/DMRD >	43	N.C
10	N.C	44	N.C
11	DMA 9 >	45	N.C
12	DMA 8 >	46	N.C
13	N.C	47	N.C
14	N.C	48	N.C
15	/DMWR >	49	N.C
16	N.C	50	N.C
17	+5V	51	+5V
18	N.C	52	N.C
19	N.C	53	N.C
20	N.C	54	N.C
21	N.C	55	/DCAS 1 >
22	DMA 7 >	56	/DCAS 0 >
23	DMA 6 >	57	N.C
24	DMA 5 >	58	N.C
25	DMA 4 >	59	N.C
26	DMA 3 >	60	N.C
27	DMA 2 >	61	N.C
28	DMA 1 >	62	N.C
29	DMA 0 >	63	N.C
30	< DMD 0 >	64	< DMD 8 >
31	< DMD 1 >	65	< DMD 9 >
32	< DMD 2 >	66	< DMD 10 >
33	N.C	67	< CD 2
34	COM 1	68	COM 1

Table 4 (SAF/HDD interface - FCU)

FCU CN504	NAME	FCU CN504	NAME
1	COM 1	45	COM 1
2	< CPD 0 >	46	< CPD 1 >
3	< CPD 2 >	47	< CPD 3 >
4	< CPD 4 >	48	< CPD 5 >
5	< CPD 6 >	49	< CPD 7 >
6	< CPD 8 >	50	< CPD 9 >
7	< CPD 10 >	51	< CPD 11 >
8	< CPD 12 >	52	< CPD 13 >
9	+5V	53	< CPD 14 >
10	< CPD 10 >	54	/MRD >
11	< DMD 15 >	55	/MWRH >
12	/MWRL >	56	COM 1
13	CPA 1 >	57	CPA 2 >
14	CPA 3 >	58	CPA 4 >
15	+5V	59	CPA 5 >
16	CPA 6 >	60	CPA 7 >
17	< DMD 14 >	61	CPA 8 >
18	CPA 9 >	62	CPA 10 >
19	CPA 11 >	63	COM 1
20	CPA 12 >	64	CPA 13 >
21	CPA 14 >	65	CPA 15 >
22	/FROMCS >	66	/SRAMCS >
23	RTCCS >	67	< /INTHDD
24	+12V	68	< DMD 0 >
25	DMD 13 >	69	< DMD 1 >
26	< DMD 2 >	70	< DMD 3 >
27	< /EXCARD	71	< DMD 4 >
28	< DMD 5 >	72	< DMD 6 >
29	< DMD 7 >	73	COM 1
30	< DMD 8 >	74	< DMD 9 >
31	< DMD 10 >	75	< DMD 11 >
32	+5VD	76	/RAS 0 >
33	/CAS0 >	77	/CAS 1 >
34	/DMMRD >	78	/DMMWR >
35	< DMD 12 >	79	/HDCS >
36	/DMIORD >	80	/RESET >
37	+5V	81	/DMIOWR >
38	DMA 1 >	82	DMA 2 >
39	DMA 3 >	83	DMA 4 >
40	DMA 5 >	84	DMA 6 >
41	DMA 7 >	85	DMA 8 >
42	DMA 9 >	86	DMA 10 >
43	HDDACK >	87	DMA 11 >
44	COM 1	88	COM 1

Table 5 (CIG4 - FCU)

FCU CN505	NAME	FCU CN505	NAME
1	VTXMD >	21	CPA 3 >
2	< VRXMDM	22	CPA 2 >
3	COM3	23	CPA 1 >
4	-12V	24	CPA 0 >
5	/G4CS >	25	COM 3
6	/RESET >	26	< CPD 7 >
7	COM3	27	< CPD 6 >
8	< /INTG4	28	< CPD 5 >
9	< /CWAIT	29	< CPD 4 >
10	/CODCCS >	30	< CPD 3 >
11	CPA 14 >	31	< CPD 2 >
12	CPA 13 >	32	< CPD 1 >
13	CPA 12 >	33	< CPD 0 >
14	CPA 10 >	34	/MWRL >
15	CPA 9 >	35	N.C
16	CPA 8 >	36	/MRD >
17	CPA 7 >	37	COM 3
18	CPA 6 >	38	+24V
19	CPA 5 >	39	COM 3
20	CPA 4 >	40	+24V

Table 6 (DIU (RS232C) - FCU)

FCU CN506	NAME	FCU CN506	NAME
1	< CPD 0 >	13	< CPD 6 >
2	< CPA 0 >	14	/IOWR >
3	< CPD 1 >	15	< CPD 7 >
4	< CPA 1 >	16	/RST232 >
5	< CPD 2 >	17	< IOIT2
6	< CPA 2 >	18	/R232CS >
7	< CPD 3 >	19	N.C
8	< CPA 3 >	20	N.C
9	< CPD 4 >	21	+5V
10	N.C	22	N.C
11	< CPD 5 >	23	COM 1
12	/IORD >	24	N.C

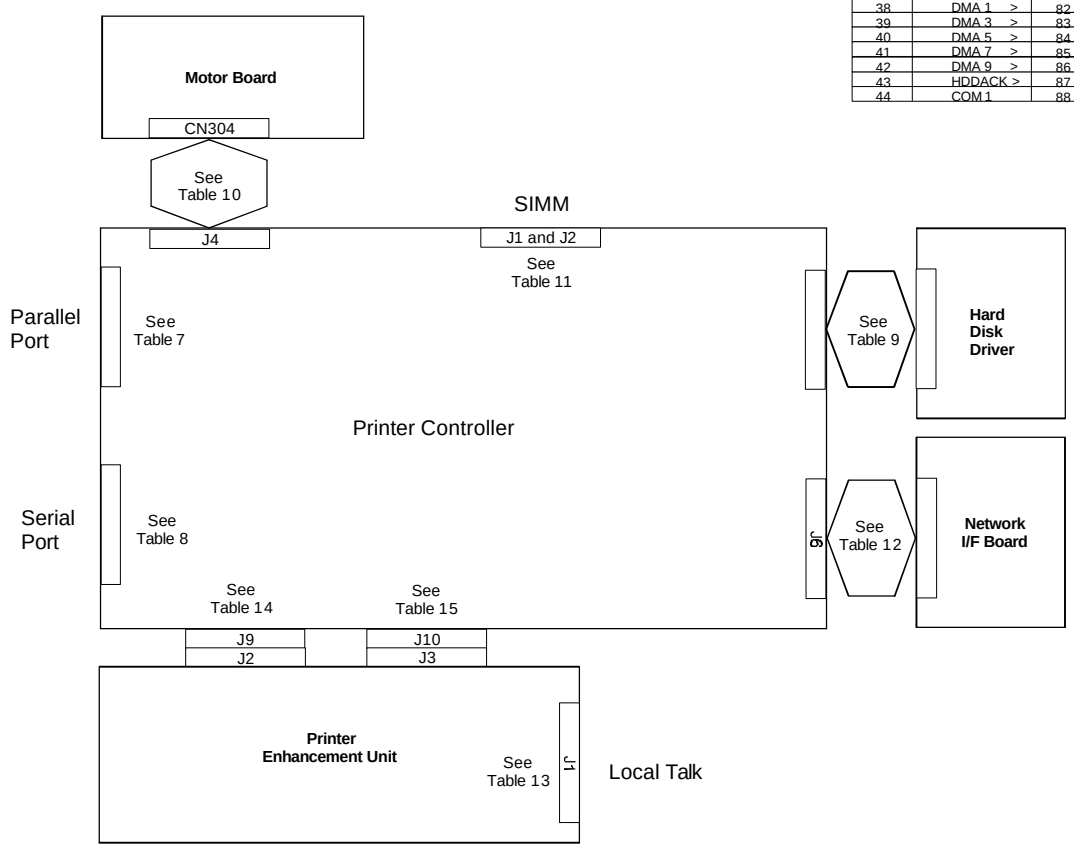

Table 7 (Parallel Porl - Printer Controller)

PIN	NAME
1	< /STROBE
2	< DATA BIT 0 >
3	< DATA BIT 1 >
4	< DATA BIT 2 >
5	< DATA BIT 3 >
6	< DATA BIT 4 >
7	< DATA BIT 5 >
8	< DATA BIT 6 >
9	< DATA BIT 7 >
10	/ACKNLG >
11	BUSY >
12	PE >
13	SLCK >
14	< /AUTO FEED XT
15	NC
16	GND
17	GND
18	NC
19~30	GND
31	< /INIT
32	/ERROR >
33	GND
34	NC
35	NC
36	< /SLCT IN

Table 8 (Serial Porl - Printer Controller)

PIN	NAME
2	STXD >
3	< SRXD
4	+10V >
6	< SDSR
20	SDTR >

Table 9 (Hard Disk Driver - Printer Controller)

PIN	NAME	PIN	NAME
1	CPURST >	26	GND
2	GND	27	CHRDY (5V)
3	< DATA 7 >	28	GND
4	< DATA 8 >	29	NC
5	< DATA 6 >	30	GND
6	< DATA 9 >	31	< HDDINT
7	< DATA 5 >	32	NC
8	< DATA 10 >	33	ADDRESS 3 >
9	< DATA 4 >	34	NC
10	< DATA 11 >	35	ADDRESS 2 >
11	< DATA 3 >	36	ADDRESS 4 >
12	< DATA 12 >	37	/ HDDCS0 >
13	< DATA 2 >	38	/ HDDCS1 >
14	< DATA 13 >	39	NC
15	< DATA 1 >	41	+5V
16	< DATA 14 >	42	+5V
17	< DATA 0 >	44	NC
18	< DATA 15 >	47	NC
19	GND	48	NC
20	NC	49	NC
21	NC	50	NC
22	GND		
23	< / IOWR		
24	GND		
25	< /IORD		

Table 10 (Motor Board - Printer Controller)

PIN	NAME
A1	< / EBD
A2	/ CVDO >
A3	< / EVSYNC
A4	< / ESTS
A5	ECMD >
A6~10	+5V
B1~3	NC
B4	< / ESBSY
B5	/ ECBSY >
B6~10	GND

Table 11 (SIMM - Printer Controller)

PIN	NAME	PIN	NAME
1	GND	37	NC
2	< DATA 0 >	38	NC
3	< DATA 16 >	39	GND
4	< DATA 1 >	40	CAS 0 >
5	< DATA 17 >	41	CAS 2 >
6	< DATA 2 >	42	CAS 3 >
7	< DATA 18 >	43	CAS 1 >
8	< DATA 3 >	44	RAS 0 >
9	< DATA 19 >	45	RAS 1 >
10	+5V	46	NC
11	NC	47	/ WE >
12	ADDRESS 0 >	48	NC
13	ADDRESS 1 >	49	< DATA 8 >
14	ADDRESS 2 >	50	< DATA 24 >
15	ADDRESS 3 >	51	< DATA 9 >
16	ADDRESS 4 >	52	< DATA 25 >
17	ADDRESS 5 >	53	< DATA 10 >
18	ADDRESS 6 >	54	< DATA 26 >
19	ADDRESS 10>	55	< DATA 11 >
20	< DATA 4 >	56	< DATA 27 >
21	< DATA 40 >	57	< DATA 12 >
22	< DATA 5 >	58	< DATA 28 >
23	< DATA 21 >	59	+5V
24	< DATA 6 >	60	< DATA 29 >
25	< DATA 22 >	61	< DATA 13 >
26	< DATA 7 >	62	< DATA 30 >
27	< DATA 23 >	63	< DATA 14 >
28	ADDRESS 7 >	64	< DATA 31 >
29	NC	65	< DATA 15 >
30	+5V	66	NC
31	ADDRESS 8 >	67	NC
32	ADDRESS 9 >	68	NC
33	RAS 3 >	69	NC
34	RAS 2 >	70	NC
35	NC	71	NC
36	NC	72	GND

Table 12 (Network I/F Board - Printer Controller)

PIN	NAME	PIN	NAME
1	NC	27	ADDRESS 4 >
2	+5V	28	ADDRESS 5 >
3	GND	29	ADDRESS 6 >
4	< DATA 0 >	30	ADDRESS 7 >
5	< DATA 1 >	31	ADDRESS 8 >
6	< DATA 2 >	32	ADDRESS 9 >
7	< DATA 3 >	33	ADDRESS 10 >
8	< DATA 4 >	34	ADDRESS 11 >
9	< DATA 5 >	35	ADDRESS 12 >
10	< DATA 6 >	36	ADDRESS 13 >
11	< DATA 7 >	37	ADDRESS 14 >
12	< DATA 8 >	38	ADDRESS 15 >
13	< DATA 9 >	39	GND
14	< DATA 10 >	40	GND
15	+5V	41	< / XNICID
16	+5V	42	< / NICINT
17	< DATA 11 >	43	/ PNTIRQ >
18	< DATA 12 >	44	/ BHE >
19	< DATA 13 >	45	< / NICREQ
20	< DATA 14 >	46	/ NICACK >
21	< DATA 15 >	47	/ IOWR >
22	GND	48	/ NICCS >
23	ADDRESS 0 >	49	/ IORD >
24	ADDRESS 1 >	50	< / RDY
25	ADDRESS 2 >	51	CPURST >
26	ADDRESS 3 >	52	CLK2 >

Table 13 (Local Talk - Printer Enhancement Unit)

PIN	NAME
1	GND
2	< HSK
3	TXD- >
4	GND
5	< RXD-
6	TXD+ >
7	NC
8	< RXD+

Table 14 (Printer Enhancement Unit - Printer Controller)

PIN	NAME	PIN	NAME	PIN	NAME
A1	< DATA16 >	B1	< DATA17 >	C1	< DATA18 >
A2	< DATA19 >	B2	< DATA20 >	C2	< DATA21 >
A3	< DATA22 >	B3	< DATA23 >	C3	< DATA24 >
A4	< DATA25 >	B4	+ 5V	C4	GND
A5	GND	B5	< SCCCS	C5	< /ROMCS 1
A6	< ADDRESS 0	B6	< ADDRESS 1	C6	< ADDRESS 2
A7	< ADDRESS 3	B7	< ADDRESS 4	C7	< ADDRESS 5
A8	< ADDRESS 6	B8	< ADDRESS 7	C8	< ADDRESS 8
A9	+ 5V	B9	GND	C9	< ADDRESS 9
A10	< ADDRESS 10	B10	< ADDRESS 11	C10	< ADDRESS 12
A11	< ADDRESS 13	B11	< ADDRESS 14	C11	< ADDRESS 15
A12	< ADDRESS 16	B12	+ 5V	C12	GND
A13	< ADDRESS 17	B13	< ADDRESS 18	C13	< ADDRESS 19
A14	< ADDRESS 20	B14	< ADDRESS 21	C14	< ADDRESS 22
A15	< ADDRESS 23	B15	< ADDRESS 24	C15	+ 5V
A16	GND	B16	< ADDRESS 25	C16	< ADDRESS 26
A17	< ADDRESS 27	B17	< ADDRESS 28	C17	< ADDRESS 29
A18	< ADDRESS 30	B18	< ADDRESS 31	C18	GND
A19	GND	B19	< /ALE	C19	< /DEN
A20	< /BLAST	B20	< /W/R	C20	< CPURST
A21	+ 5V	B21	GND	C21	+ 5V
A22	/ARAMWR >	B22	/ARAMOE >	C22	AMA 0 >
A23	AMA 1 >	B23	AMA 2 >	C23	AMA 3 >
A24	AMA 4 >	B24	AMA 5 >	C24	AMA 6 >
A25	AMA 7 >	B25	AMA 8 >	C25	AMA 9 >
A26	AMA 10 >	B26	< ALE	C26	/ACAS 0 >
A27	/ACAS 1 >	B27	ACAS 2 >	C27	/ACAS 3 >
A28	+ 5V	B28	GND	C28	GND
A29	+ 5V	B29	/ARAS 0 >	C29	/ARAS 1 >
A30	/ARAS 2 >	B30	/ARAS 3 >	C30	/ARAS 4 >
A31	/ARAS 5 >	B31	/ARAS 6 >	C31	+ 5V
A32	+ 5V	B32	GND	C32	GND

Table 15 (Printer Enhancement Unit - Printer Controller)

PIN	NAME	PIN	NAME	PIN	NAME
A1	< DATA 0 >	B1	< DATA 1 >	C1	< DATA 2 >
A2	< DATA 3 >	B2	< DATA 4 >	C2	GND
A3	GND	B3	< DATA 5 >	C3	< DATA 6 >
A4	< DATA 7 >	B4	< DATA 8 >	C4	+ 5V
A5	GND	B5	< DATA 9 >	C5	< DATA 10 >
A6	< DATA 11 >	B6	< DATA 12	C6	GND
A7	GND	B7	< DATA 13 >	C7	< DATA 14 >
A8	< DATA 15 >	B8	+ 5V	C8	GND
A9	GND	B9	< DATA 26 >	C9	< DATA 27 >
A10	< DATA 28 >	B10	< DATA 29 >	C10	< DATA 30 >
A11	< DATA 31 >	B11	GND	C11	+ 5V
A12	+ 5V	B12	GND	C12	< /D5BREQ
A13	< /D5BACK	B13	/SCCREQ >	C13	NC
A14	+ 5V	B14	GND	C14	GND
A15	+ 5V	B15	/SOO1INT >	C15	/SCCINT >
A16	+ 5V	B16	GND	C16	GND
A17	GND	B17	+ 5V	C17	< /RDY
A18	< CLK 2	B18	GND	C18	GND
A19	+ 5V	B19	+ 5V	C19	< /IORD
A20	< /IOWR	B20	< /DRAMOE	C20	< /ORAMWR
A21	+ 5V	B21	+ 5V	C21	< DMA 0
A22	< DMA 1	B22	< DMA 2	C22	< DMA 3
A23	< DMA 4	B23	< DMA 5	C23	< DMA 6
A24	< DMA 7	B24	< DMA 8	C24	< DMA 9
A25	< DMA 10	B25	< DMA 11	C25	GND
A26	GND	B26	< /DCAS 0	C26	< /DCAS 1
A27	< /DCAS 2	B27	< /DCAS 3	C27	+ 5V
A28	GND	B28	< /DRAS 0	C28	< /DRAS 1
A29	< /DRAS 2	B29	< /DRAS 3	C29	< /DRAS 4
A30	< /DRAS 5	B30	< /DRAS 6	C30	< /DRAS 7
A31	< /DRAS 8	B31	< /DRAS 9	C31	+ 5V
A32	+ 5V	B32	GND	C32	GND

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ELECTRICAL COMPONENT LAYOUT

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